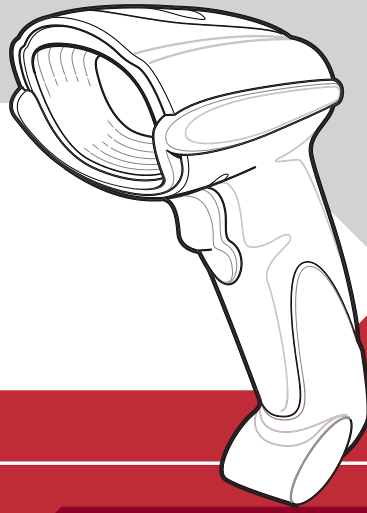
DS 6608



Product Reference Guide

symbol®
The Enterprise Mobility Company™

DS 6608
Product Reference Guide

72-67563-02
Revision A
June 2004

The Enterprise Mobility Company ™

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Contents

Chapter 3. Maintenance and Technical Specifications

Chapter 4. User Preferences

Chapter 5. Decoding Preferences

Chapter 6. Keyboard Wedge Interface

Chapter 7. RS-232 Interface

Chapter 8. USB Interface

Chapter 9. IBM 468X/469X Interface

Chapter 10. Wand Emulation Interface

Chapter 11. Scanner Emulation Interface

Chapter 12. 123 Scan

Chapter 13. Symbologies

Appendix A. Standard Default Parameters

Appendix B. Programming Reference

Appendix C. Sample Bar Codes

Appendix D. Numeric Bar Codes

Appendix E. ASCII Character Sets

Glossary

Index

About This Guide

Introduction

The *DS 6608 Product Reference Guide* provides general instructions for setting up, operating, maintaining, and troubleshooting the DS 6608 Standard Range and DS 6608 High Density digital scanners.

Chapter Descriptions

- *Chapter 1, Getting Started* provides a product overview, unpacking instructions, and cable connection information.
- *Chapter 2, Scanning* describes parts of the digital scanner, beeper and LED definitions, and how to use the digital scanner in hand-held and hands-free modes.
- *Chapter 3, Maintenance and Technical Specifications* provides information on how to care for the digital scanner, troubleshooting, and technical specifications.
- *Chapter 4, User Preferences* provides programming bar codes for selecting user preference features for the digital scanner.
- *Chapter 5, Decoding Preferences* provides programming bar codes for selecting digital scanner preference features.
- *Chapter 6, Keyboard Wedge Interface* describes how to set up a Keyboard Wedge interface with the digital scanner.
- *Chapter 7, RS-232 Interface* describes how to set up the digital scanner with an RS-232 host, such as point-of-sale devices, host computers, or other devices with an available RS-232 port.
- *Chapter 8, USB Interface* describes how to set up the digital scanner with a USB host.
- *Chapter 9, IBM 468X/469X Interface* describes how to set up the digital scanner with IBM 468X/469X POS systems.
- *Chapter 10, Wand Emulation Interface* describes how to set up the digital scanner with a Wand Emulation host when Wand Emulation communication is needed.
- *Chapter 11, Scanner Emulation Interface* describes how to set up the digital scanner with an Undecoded Scanner Emulation host.
- *Chapter 12, 123 Scan* describes the 123Scan PC-based scanner configuration tool, and provides the bar code to scan to communicate with the 123Scan program.
- *Chapter 13, Symbologies* describes all symbology features and provides the programming bar codes necessary for selecting these features for the digital scanner.
- *Chapter 14, Miscellaneous Scanner Options* includes commonly used bar codes to customize how data is transmitted to the host device.
- *Chapter 15, Advanced Data Formatting* (ADF) describes how to customize scanned data before transmitting to the host.
- *Chapter A, Standard Default Parameters* provides a table of all host devices and miscellaneous scanner defaults.
- *Chapter B, Programming Reference* provides a table of AIM code identifiers, ASCII character conversions, and keyboard maps.
- *Chapter C, Sample Bar Codes* includes sample bar codes.
- *Chapter D, Numeric Bar Codes* includes the numeric bar codes to scan for parameters requiring specific numeric values.
- *Chapter E, ASCII Character Sets* provides ASCII character value tables.

Notational Conventions

The following conventions are used in this document:

- Bullets (•) indicate:
  - action items
  - lists of alternatives
  - lists of required steps that are not necessarily sequential.
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.

- Throughout the programming bar code menus, asterisks (*) are used to denote default parameter settings.

* Indicates Default — ***Baud Rate 9600** — Feature/Option

Related Publications

The *DS 6608 Quick Start Guide*, p/n 72-67311-xx, provides general information for getting started with the digital scanner, and includes basic set up and operation instructions.

For the latest versions of the *DS 6608 Quick Start Guide* and *Product Reference Guide* go to: http://www.symbol.com/manuals.

Service Information

If you have a problem with your equipment, contact the *Symbol Support Center* for your region. See page xvi for contact information. Before calling, have the model number, serial number, and several of your bar code symbols at hand.

Call the Support Center from a phone near the scanning equipment so that the service person can try to talk you through your problem. If the equipment is found to be working properly and the problem is symbol readability, the Support Center will request samples of your bar codes for analysis at our plant.

If your problem cannot be solved over the phone, you may need to return your equipment for servicing. If that is necessary, you will be given specific directions.

Note: Symbol Technologies is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty. If the original shipping container was not kept, contact Symbol to have another sent to you.

Symbol Support Center

For service information, warranty information, or technical assistance contact or call the Symbol Support Center in:

United States
Symbol Technologies, Inc.
One Symbol Plaza
Holtsville, New York 11742-1300
1-800-653-5350

Canada
Symbol Technologies Canada, Inc.
2540 Matheson Boulevard East
Mississauga, Ontario, Canada L4W 4Z2
905-629-7226

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Symbol Technologies Asia, Inc (Singapore Branch)
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Bugis Junction Office Tower
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Symbol Technologies Italia S.R.L.
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2730 University Dr.
Coral Springs, FL 33065 USA
1-800-347-0178 (Inside United States)
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954-340-9454 (Fax)

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Symbol Technologies Mexico Ltd.
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5-520-1835 (Inside Mexico)
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Kerkplein 2, 7051 CX
Postbus 24 7050 AA
Varsseveld, Netherlands
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Symbol's registered and mailing address:
Symbol Technologies Norway
Hoybratenveien 35 C
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Symbol's repair depot and shipping address:
Symbol Technologies Norway
Enebakkveien 123
N-0680 OSLO, Norway

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Support E-Mail: Sweden.Support@se.symbol.com

If you purchased your Symbol product from a Symbol Business Partner, contact that Business Partner for service.

1

Getting Started

Introduction

The DS 6608 combines superior 1D and 2D omnidirectional bar code scanning and advanced ergonomics to provide the best value in a digital scanner. Whether in hand-held mode or hands-free mode in a stand, the digital scanner ensures comfort and ease of use for extended periods of time.

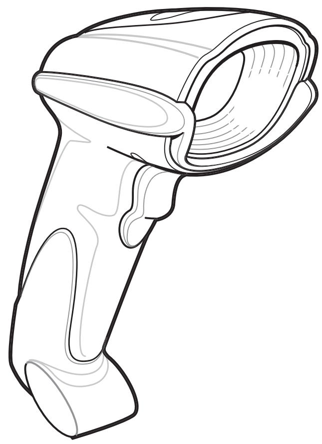


Figure 1-1. DS 6608 Digital Scanner

The digital scanner supports:

- Keyboard Wedge connection to a host. The host interprets scanned data as keystrokes. This interface supports the following international keyboards (for Windows® environment): North America, German, French, French Canadian, Spanish, Italian, Swedish, UK English, Portuguese-Brazilian, and Japanese.
- Standard RS-232 connection to a host. Scan bar code menus to set up proper communication of the digital scanner with the host.
- USB connection to a host. The digital scanner autodetects a USB host and defaults to the HID keyboard interface type. Select other USB interface types by scanning programming bar code menus.This interface supports the following international keyboards (for Windows® environment): North America, German, French, French Canadian, Spanish, Italian, Swedish, UK English, Portuguese-Brazilian, and Japanese.
- Connection to IBM 468X/469X hosts. Scan bar code menus to set up communication of the digital scanner with the IBM terminal.
- Wand Emulation connection to a host. The digital scanner is connected to a portable data terminal, a controller, or host which collects the data as wand data and decodes it.
- Scanner Emulation connection to a host. The digital scanner is connected to a portable data terminal, a controller which collects the data and interprets it for the host.
- Synapse capability which allows connection to a wide variety of host systems using a Synapse and Synapse adapter cable. The digital scanner autodetects the host.
- Configuration via 123Scan.

Unpacking

Remove the digital scanner from its packing and inspect it for damage. If the digital scanner was damaged in transit, call the *Symbol Support Center* at one of the telephone numbers listed on page xvi. **KEEP THE PACKING**. It is the approved shipping container; use this to return the equipment for servicing.

Setting Up the Digital Scanner

Installing the Interface Cable

1. Plug the interface cable modular connector into the cable interface port on the bottom of the scanner handle. (See Figure 1-2.)
2. Gently tug the cable to ensure the connector is properly secured.
3. Connect the other end of the interface cable to the host (see the specific host chapter for information on host connections).

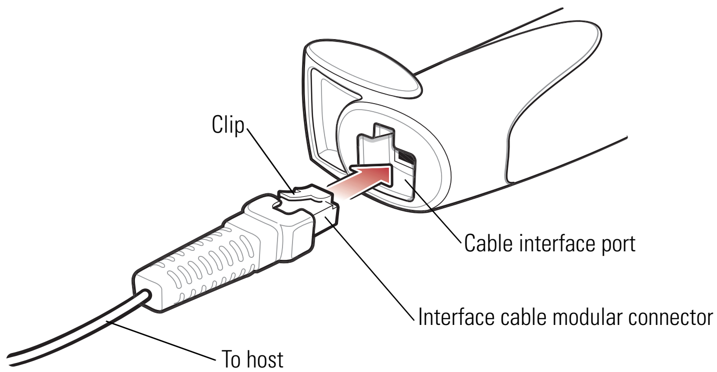
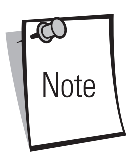


Figure 1-2. Installing the Cable



Note: Different cables are required for different hosts. The connectors illustrated in each host chapter are examples only. Connectors vary from those illustrated, but the steps to connect the digital scanner remain the same.

Removing the Interface Cable

1. Using the tip of a screwdriver, depress the cable's modular connector clip.

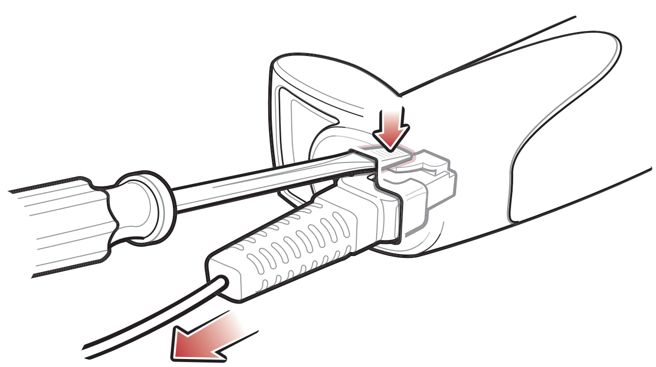
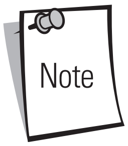


Figure 1-3. Removing the Cable

2. Carefully slide out the cable.
3. Follow the steps for *Installing the Interface Cable on page 1-4* to connect a new cable.

Connecting a Synapse Cable Interface



Note

Refer to the *Synapse Interface Guide* provided with the Synapse cable for detailed setup instructions.

Symbol's Synapse Smart Cables enable interfacing to a variety of hosts. The Synapse cable has built-in intelligence to detect that host.

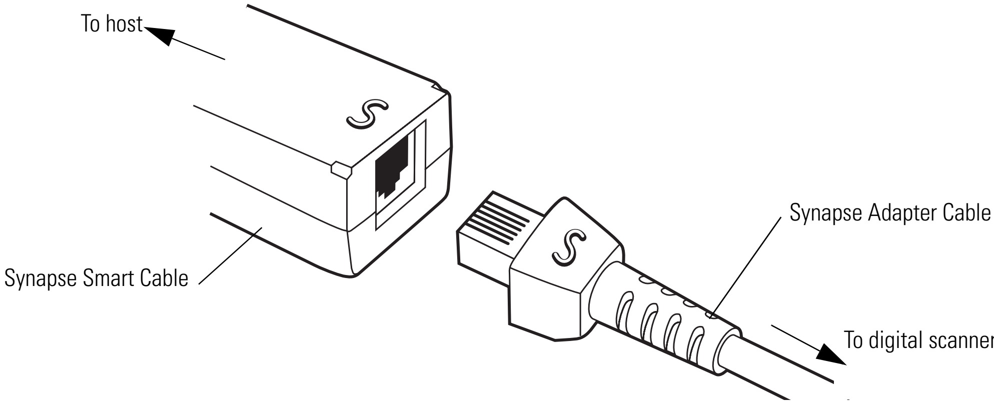


Figure 1-4. Synapse Cable Connection

1. Plug the Synapse adapter cable (p/n 25-32463-xx) into the bottom of the digital scanner, as described in *Installing the Interface Cable on page 1-4*.
2. Align the 'S' on the Synapse adapter cable with the 'S' on the Synapse Smart Cable and plug the cable in.
3. Connect the other end of the Synapse Smart Cable to the host.

Connecting Power (if required)

If the host does not provide power to the digital scanner, connect an external power supply to the digital scanner:

1. Connect the interface cable to the bottom of the digital scanner, as described in *Installing the Interface Cable on page 1-4*.
2. Connect the other end of the interface cable to the host (refer to the host manual to locate the correct port).
3. Plug the power supply into the power jack on the interface cable. Plug the other end of the power supply into an AC outlet.

Configuring the Digital Scanner

To configure the digital scanner, use the bar codes included in this manual, or the 123Scan configuration program.

See *Chapter 4, User Preferences* for information about programming the digital scanner using bar code menus. Also see each host-specific chapter to set up connection to a specific host type.

See *Chapter 12, 123 Scan* to configure the digital scanner using this configuration program. A help file is available in the program.

Mounting the Digital Scanner

Desk Mount

Use the optional desk mount for convenient and protective placement of the digital scanner on a flat surface. Simply place the mount on the surface. The rubber feet hold the mount securely in place when inserting and removing the digital scanner.

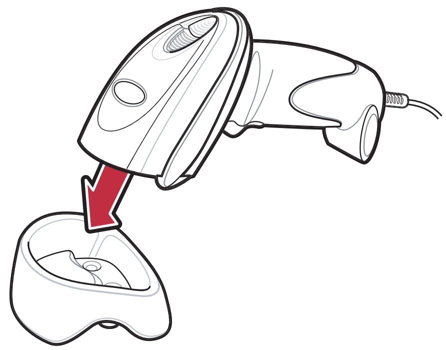


Figure 1-5. Inserting the Digital Scanner in the Desk Mount

The desk mount can also be secured to a desk surface by inserting two screws* appropriate for the mounting surface through the screw holes of the desk mount, and into the surface. The desk mount can be screwed onto the surface with or without the rubber feet.

*The recommended screws are two #6 screws (5/8" long).

Wall Mount

To use the optional wall mount to mount the digital scanner on a wall, place the mount in the desired location on the wall and secure by inserting two screws* appropriate for the mounting surface through the screw holes on the mount, and into the surface. Insert the digital scanner into the mount as shown.

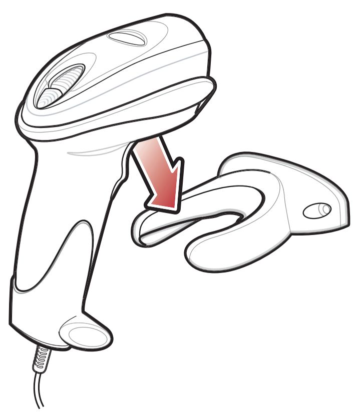


Figure 1-6. Securing the Wall Mount

*The recommended screws are two #6 screws (1" long) and two #6 washers.

For convenience, print this page and use the template below for mounting hole locations.

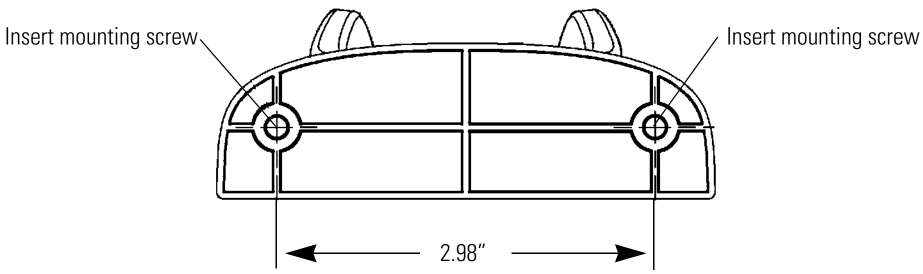


Figure 1-7. Wall Mounting Template

2

Scanning

Introduction

This chapter provides beeper and LED definitions, techniques involved in scanning bar codes, general instructions and tips about scanning, and decode zone diagrams.

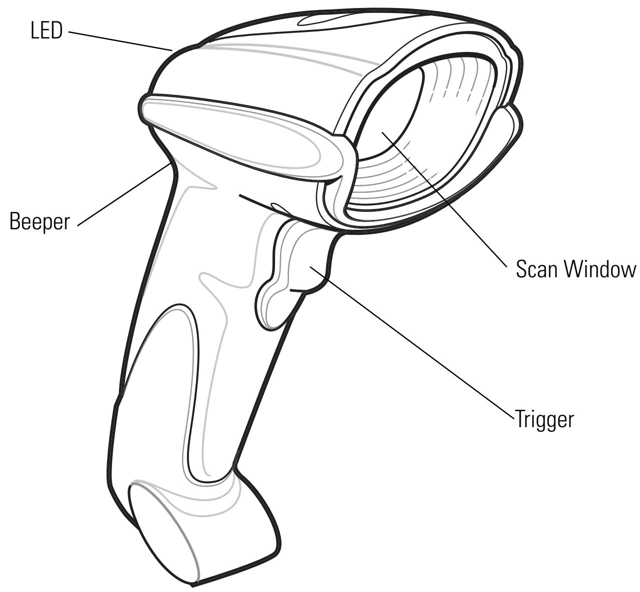


Figure 2-1. Parts

Beeper Definitions

The digital scanner issues different beep sequences and patterns to indicate status. Table 2-1 defines beep sequences that occur during both normal scanning and while programming the digital scanner.

Table 2-1. Beeper Definitions

Beeper Sequence	Indication
Standard Use	
Low/medium/high beeps	Power up.
Short high beep	A bar code symbol was decoded (if decode beeper is enabled).
4 long low beeps	A transmission error was detected in a scanned symbol. The data is ignored. This occurs if the digital scanner is not properly configured. Check option setting.
5 low beeps	Conversion or format error.
Lo/hi/lo beeps	ADF transmit error. See *Chapter 15, Advanced Data Formatting*.
Hi/hi/hi/lo beeps	RS-232 receive error.
Parameter Menu Scanning	
Short high beep	Correct entry scanned or correct menu sequence performed.
Lo/hi beeps	Input error; incorrect bar code, programming sequence, or **Cancel** scanned; remain in ADF program mode.
Hi/lo beeps	Keyboard parameter selected. Enter value using numeric bar codes.
Hi/lo/hi/lo beeps	Successful program exit with change in parameter setting.
Low/hi/low/hi beeps	Out of host parameter storage space. Scan *Set Default Parameter on page 4-5*.
Code 39 Buffering	
Hi/lo beeps	New Code 39 data was entered into the buffer.
3 long high beeps	Code 39 buffer is full.
Lo/hi/lo beeps	The Code 39 buffer was erased or there was an attempt to clear or transmit an empty buffer.
Lo/hi beeps	A successful transmission of buffered data.
Macro PDF	
2 long low beeps	File ID error. A bar code not in the current MPDF sequence was scanned.
3 long low beeps	Out of memory. There is not enough buffer space to store the current MPDF symbol.
4 long low beeps	Bad symbology. Scanned a 1D or 2D bar code in a MPDF sequence, a duplicate MPDF label, a label in an incorrect order, or trying to transmit an empty or illegal MPDF field.
5 long low beeps	Flushing MPDF buffer.
Fast warble beep	Aborting MPDF sequence.
Lo/Hi beeps	Flushing an already empty MPDF buffer.
ADF Programming: Normal Data Entry. Duration of tones are short.	
Hi/Lo beeps	Enter another digit. Add leading zeros to the front if necessary.
Lo/Lo beeps	Enter another alphabetic character or scan the **End of Message** bar code.
Hi/Hi beeps	Enter another criterion or action, or scan the **Save Rule** bar code.
Hi/Lo/Hi/Lo beeps	Rule saved. Rule entry mode exited.
Hi/Lo/Lo beeps	All criteria or actions cleared for current rule, continue entering rule.

Table 2-1. Beeper Definitions (Continued)

Beeper Sequence	Indication
Low beep	Delete last saved rule. The current rule is left intact.
Lo/Hi/Hi beeps	All rules are deleted.
ADF Programming: Error Indications. Duration of tones are very long.	
Lo/Hi/Lo/Hi beeps	Out of rule memory. Erase some existing rules, then try to save rule again. (It is not necessary to re-enter the current rule.)
Lo/Hi/Lo beeps	Cancel rule entry. Rule entry mode exited because of an error or the user asked to exit rule entry.
Lo/Hi beeps	Entry error, wrong bar code scanned. Re-enter criterion or action. All previously entered criteria and actions are retained. Criteria or action list is too long for a rule.
Host Specific	
USB only	
4 short high beeps	Digital scannerer has not completed initialization. Wait several seconds and scan again.
Low/medium/high beeps upon scanning a USB device type	Communication with the bus must be established before the digital scanner can operate at the highest power level.
Low/medium/high beeps occur more than once.	The USB bus can put the digital scanner in a state where power to the digital scanner is cycled on and off more than once. This is normal and usually happens when the PC cold boots.
RS-232 only	
1 short high beep	A <BEL> character is received and Beep on <BEL> is enabled.

LED Definitions

In addition to beep sequences, the digital scanner uses a two-color LED to indicate status. Table 2-2 defines LED colors that display during scanning.

Table 2-2. Standard LED Definitions

LED	Indication
Off	No power is applied to the digital scanner, or the digital scanner is on and ready to scan.
Green	A bar code was successfully decoded.
Red	A data transmission error or digital scanner malfunction occurred.

Scanning in Hand-Held Mode

Install and program the digital scanner (see *Setting Up the Digital Scanner on page 1-4*). For assistance, contact the local supplier or the local *Symbol Support Center*.

Scanning with the Digital Scanner

1. Ensure all connections are secure (see the appropriate host chapter.)
2. Aim the digital scanner at the bar code.
3. Press and hold the trigger.

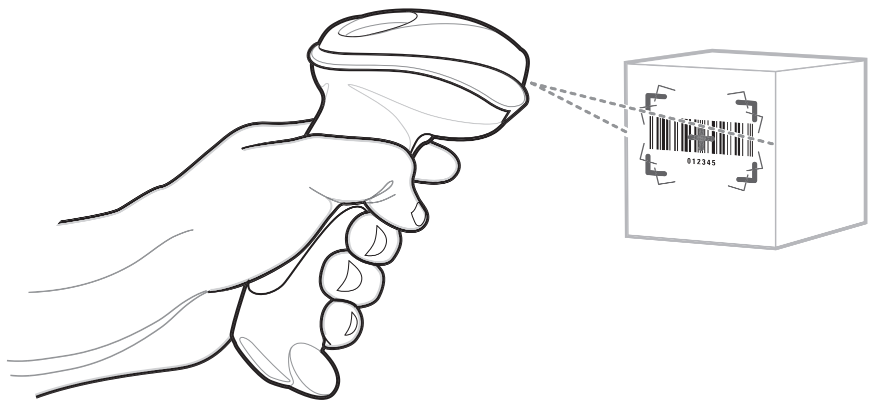


Figure 2-2. Scanning in Hand-Held Mode

4. The digital scanner projects a red laser aiming pattern (shown below) which allows positioning the bar code or object within the field of view.

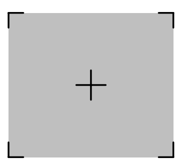


Figure 2-3. Laser Aiming Pattern

If necessary, the digital scanner turns on its red LEDs to illuminate the target bar code.

5. Center the symbol in any orientation within the aiming pattern. Be sure the entire symbol is within the rectangular area formed by the brackets in the pattern.

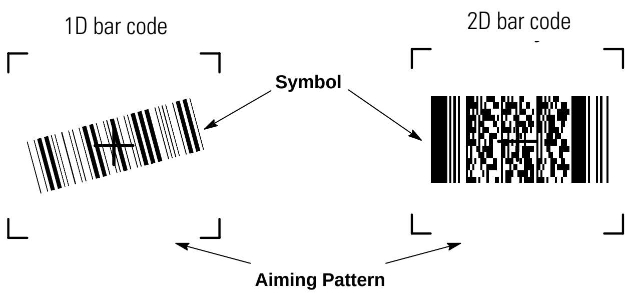


Figure 2-4. Centering Symbol in Aiming Pattern

6. Hold the trigger until the digital scanner beeps, indicating the bar code is successfully decoded. For more information on beeper and LED definitions, see Table 2-1 and Table 2-2.

This process usually occurs instantaneously. Steps 2 - 4 are repeated on poor quality or difficult bar codes, until the bar code is decoded, the trigger is released, or the Decode Session Timeout is reached.

Aiming

Hold the digital scanner between two and nine inches (depending on symbol density; see *Decode Zones on page 2-9*) from the symbol, centering the aiming pattern cross hairs on the symbol.

The aiming pattern is smaller when the digital scanner is closer to the symbol and larger when it is farther from the symbol. Scan symbols with smaller bars or elements (mil size) closer to the digital scanner, and those with larger bars or elements (mil size) farther from the digital scanner.

The digital scanner can also read a bar code presented within the aiming pattern but not centered. The top examples in Figure 2-5 show acceptable aiming options, while the bottom examples can not be decoded.

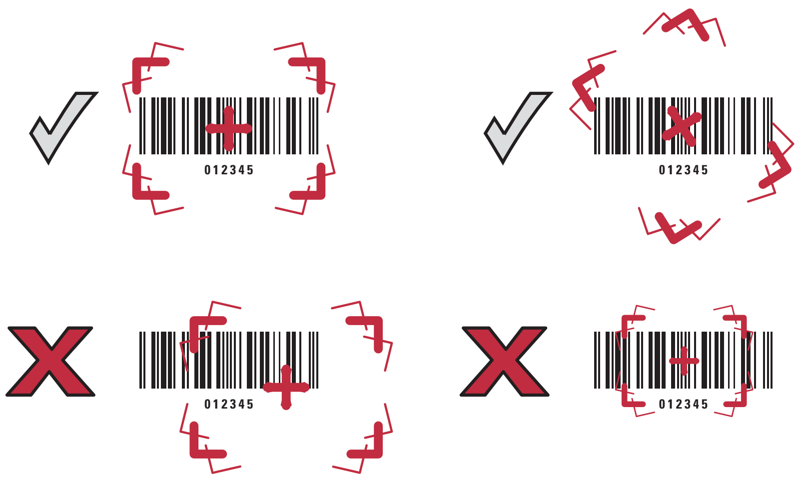


Figure 2-5. Acceptable and Incorrect Aiming

Scanning in Hands-Free Mode

The optional Intellistand adds greater flexibility to scanning operation. When the digital scanner is seated in the stand's "cup," the digital scanner's built-in sensor places the digital scanner in hands-free mode. When the digital scanner is removed from the stand it operates in its normal hand-held mode.

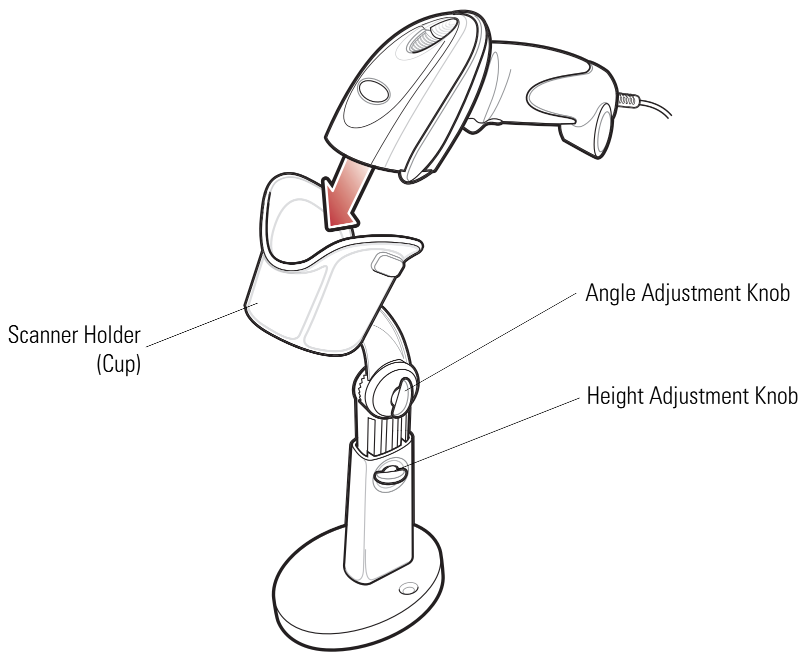


Figure 2-6. Inserting the Digital Scanner in the Intellistand

To operate the digital scanner in the IntelliStand:

1. Ensure the digital scanner is properly connected to the host (see the appropriate host chapter for information on host connections).
2. Insert the digital scanner in the Intellistand by placing the front of the digital scanner into the stand's "cup" (see Figure 2-6).
3. Use the Intellistand's adjustment knobs to adjust the height and angle of the digital scanner.
4. Center the symbol in the aiming pattern. The entire symbol must be within the brackets.
5. Upon successful decode, the digital scanner beeps and the LED turns green. For more information on beeper and LED definitions, see Table 2-1 and Table 2-2.

Decode Zones

DS 6608 Standard Range Digital Scanner

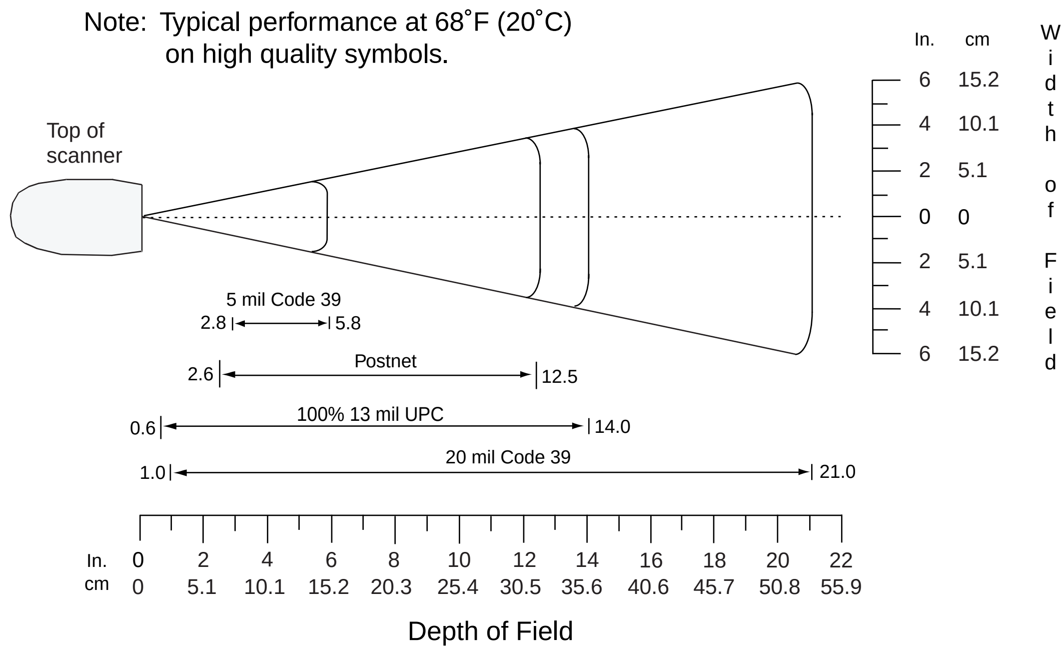


Figure 2-7. DS 6608 Standard Range Digital Scanner Decode Zone for 1D Bar Codes

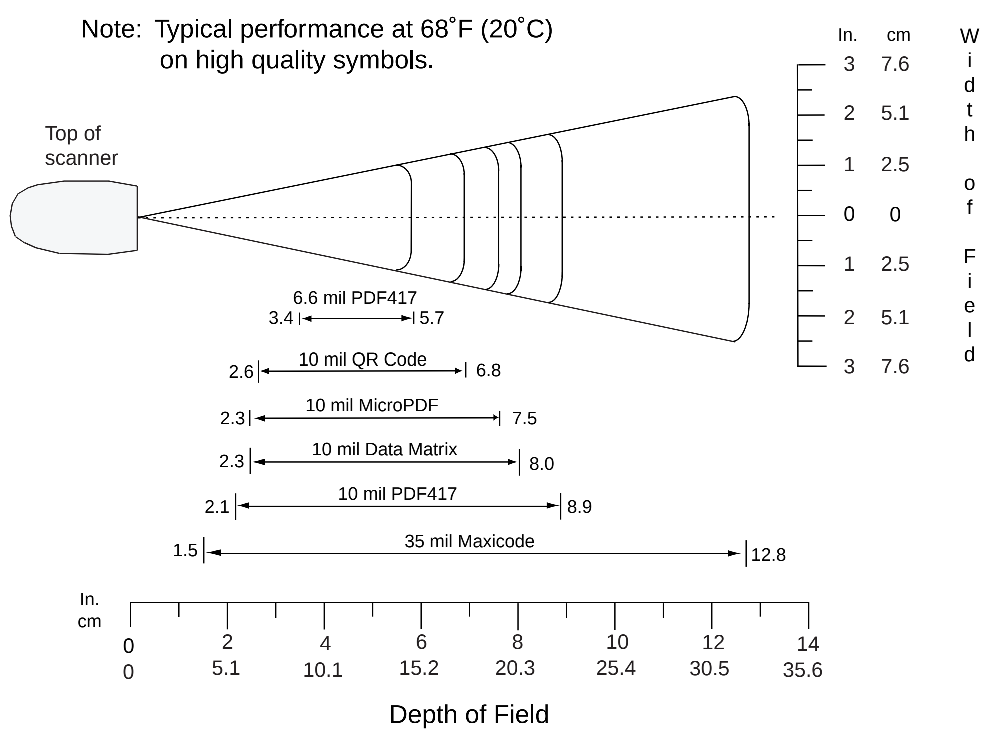


Figure 2-8. DS 6608 Standard Range Digital Scanner Decode Zone for 2D Bar Codes

DS 6608 High Density Digital Scanner

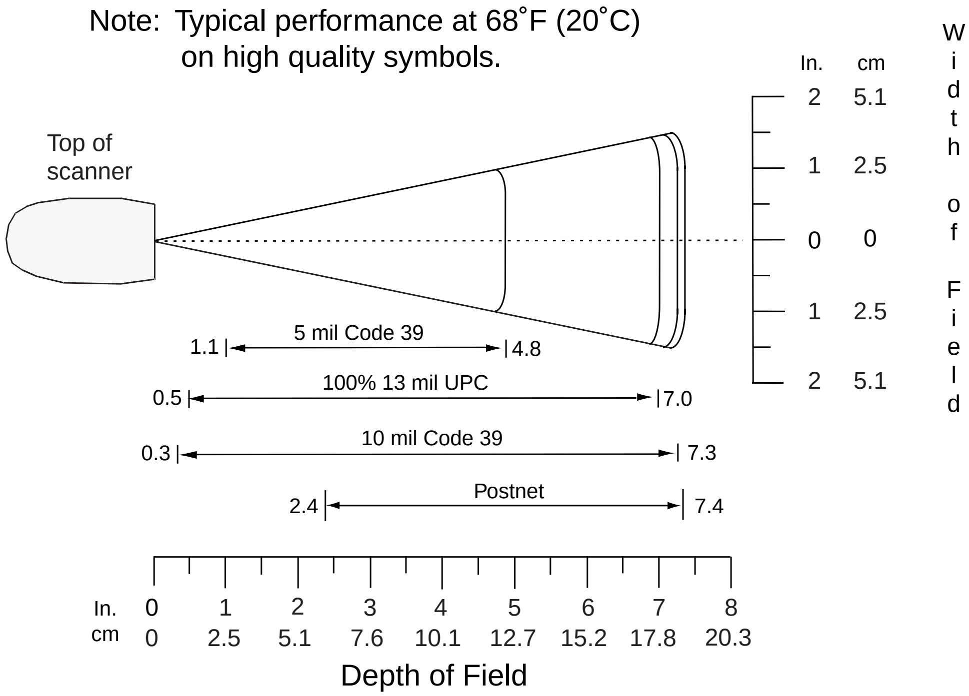


Figure 2-9. DS 6608 High Density Digital Scanner Decode Zone for 1D Bar Codes

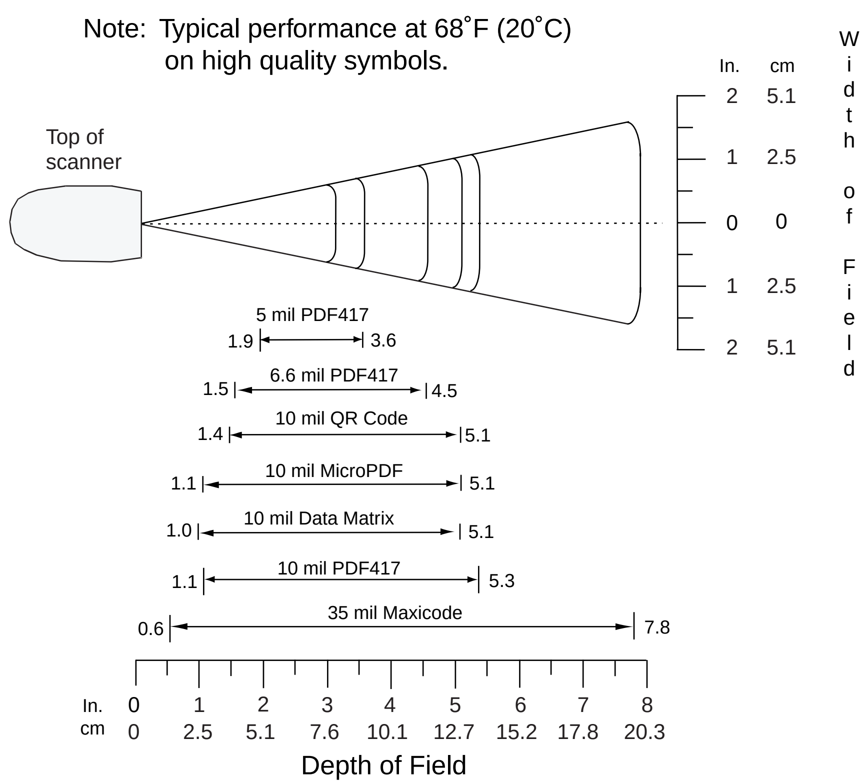


Figure 2-10. DS 6608 High Density Digital Scanner Decode Zone for 2D Bar Codes

3

Maintenance and Technical Specifications

Introduction

This chapter provides suggested scanner maintenance, troubleshooting, technical specifications, and signal descriptions (pinouts).

Maintenance

Cleaning the scan window is the only maintenance required. A dirty window can affect scanning accuracy.

- Do not allow abrasive material to touch the window.
- Remove any dirt particles with a damp cloth.
- Wipe the window using a tissue moistened with ammonia/water.
- Do not spray water or other cleaning liquids directly into the window.

Troubleshooting

Table 3-1. Troubleshooting

Problem	Possible Causes	Possible Solutions
The aiming pattern does not appear when pressing the trigger.	No power to the digital scanner.	If the configuration requires a power supply, re-connect the power supply.
	Incorrect host interface cable is used.	Connect the correct host interface cable.
	Interface/power cables are loose.	Re-connect cables.
	Digital scanner is disabled.	For Synapse or IBM 468x mode, enable the digital scanner via the host interface. Otherwise, see the technical person in charge of scanning.
	If using RS-232 Nixdorf B mode, CTS is not asserted.	Assert CTS line.
	Aiming pattern is disabled.	Enable the aiming pattern. See *Decode Aiming Pattern on page 5-5*.
Scanner emits short low/short medium/short high beep sequence (power-up beep sequence) more than once.	The USB bus may put the digital scanner in a state where power to the digital scanner is cycled on and off more than once.	Normal during host reset.
Digital scanner emits aiming pattern, but does not decode the bar code.	Digital scanner is not programmed for the correct bar code type.	Program the digital scanner to read that type of bar code. See *Chapter 13, Symbologies*.
	Bar code symbol is unreadable.	Scan test symbols of the same bar code type to determine if the bar code is defaced.
	The symbol is not completely inside aiming pattern.	Move the symbol completely within the aiming pattern.
Digital scanner emits 4 short high beeps during decode attempt.	Digital scanner has not completed USB initialization.	Wait several seconds and scan again.

Table 3-1. Troubleshooting (Continued)

Problem	Possible Causes	Possible Solutions
Digital scanner decodes bar code, but does not transmit the data to the host.	Digital scanner is not programmed for the correct host type.	Scan the appropriate host type programming bar code. See the chapter corresponding to the host type.
	Interface cable is loose.	Re-connect the cable.
	If 4 long low beeps are heard, a transmission error occurred.	Set the digital scanner's communication parameters to match the host's setting.
	If 5 low beeps are heard, a conversion or format error occurred.	Configure the digital scanner's conversion parameters properly.
	If lo/hi/lo beeps are heard, an invalid ADF rule is detected.	Program the correct ADF rules.
	If hi/lo beeps are heard, the digital scanner is buffering Code 39 data.	Normal scanning a Code 39 bar code and the Code 39 Buffering option is enabled.
Host displays scanned data incorrectly.	Digital scanner is not programmed to work with the host.	Scan the appropriate host type programming bar code.
		For RS-232, set the digital scanner's communication parameters to match the host's settings.
		For a Keyboard Wedge configuration, program the system for the correct keyboard type, and turn off the CAPS LOCK key.
		Program the proper editing options (e.g., UPC-E to UPC-A Conversion).
Digital scanner emits hi/hi/hi/Lo beeps when not in use.	RS-232 receive error.	Normal during host reset. Otherwise, set the digital scanner's RS-232 parity to match the host setting.
Digital scanner emits lo/hi beeps during programming.	Input error or **Cancel** bar code was scanned.	Scan the correct numeric bar codes within range for the parameter programmed.
Digital scanner emits lo/hi/lo/hi beeps during programming.	Out of ADF parameter storage space.	Erase all rules and re-program with shorter rules.
	Out of Synapse parameter storage space.	Scan **Set Synapse Defaults** bar code for cables no longer in use and re-program the digital scanner for the current host interface.
Digital scanner emits lo/hi/lo beeps.	Clearing Code 39 buffer.	Normal when scanning the Code 39 Buffering **Clear Buffer** bar code or upon attempt to transmit an empty Code 39 buffer.
Digital scanner emits a power-up beep after changing USB host type.	The USB bus re-established power to the digital scanner.	Normal when changing USB host type.
Digital scanner emits one high beep when not in use.	In RS-232 mode, a <BEL> character was received and Beep on <BEL> option is enabled.	Normal when **Beep on <BEL>** is enabled and the digital scanner is in RS-232 mode.

Note

If after performing these checks the digital scanner still experiences problems, contact the distributor or call the local Symbol Support Center. See *page xvi* for the telephone numbers.

Technical Specifications

Table 3-2. Technical Specifications

Item	Description
Power Requirements	5 VDC + / - 10% @ approximately 220 mA RMS (nominal), 500 mA (max)
Power Source	Depending on host: • Host powered • External power supply, 5.2 V nominal
Decode Capability	UPC/EAN, UPC/EAN with supplementals, UCC/EAN, JAN 8 & 13, 128, Code 39, Code 39 Full ASCII, Code 39 Trioptic, Codabar (NW7), Interleaved 2 of 5, Discrete 2 of 5, IATA 2 of 5, Code 128, Code 93, MSI, Code 11, Code 32, Coupon Code, Bookland EAN, RSS, US Postnet, US Planet,UK Postal, Japan Postal, Australia Postal, Dutch Postal, Composite Codes, PDF417, MicroPDF, Maxicode, Data Matrix (ECC 200), QR Code.
Beeper Operation	User-selectable: enable, disable
Beeper Volume	User-selectable: three levels
Beeper Tone	User-selectable: three tones
Yaw Tolerance	± 50° from normal
Pitch Tolerance	± 60° from normal
Roll Tolerance	± 180° from normal
Print Contrast Minimum	25% minimum reflectance differential, measured at 650 nm.
Ambient Light Immunity	10,000 Ft Candles (107,600 Lux)
Durability	6 ft (1.8 m) drop to concrete
Operating Temperature	32° to 122° F (0° to 50° C)
Storage Temperature	-40° to 158° F (-40° to 70° C)
Humidity	5% to 95% (non-condensing)
Weight (without cable)	6.4 oz. (181.4 g)
Dimensions: Height Width Depth	 6.55 in. (16.64 cm) 2.82 in. (7.16 cm) 4.72 in. (11.99 cm)
Laser	650nm laser diode
Laser Classifications	IEC 825-1 Class 2
ESD	15 kV area discharge 8 kV contact discharge
Minimum Element Width	5 mil (0.127 mm)
Interfaces Supported	RS-232, Keyboard Wedge, Wand Emulation, Scanner Emulation, IBM 468X/469X, USB, Synapse
Electrical Safety	UL1950, CSA C22.2 No.950. EN60950/IC950
Input Transient Protection	IEC 1000-4-(2,3,4,5,6,11)
EMI	FCC Part 15 Class B, ICES-003 Class B European Union EMC Directive, Japan VCCI/MITI/Dentori

Digital Scanner Signal Descriptions

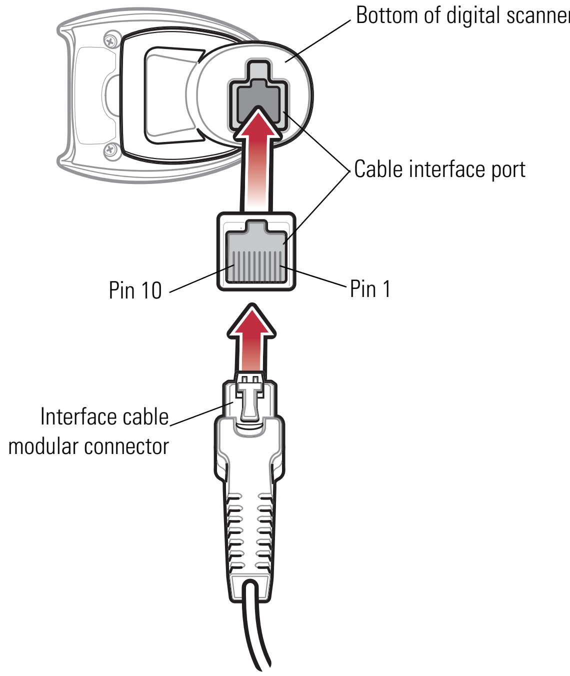


Figure 3-1. Digital Scanner Cable Pinouts

The signal descriptions in Table 3-3 apply to the connector on the digital scanner and are for reference only.

Table 3-3. Digital Scanner Signal Pin-outs

Pin	IBM	Synapse	RS-232	Keyboard Wedge	Wand	USB	Scanner Emulation
1	Reserved	SynClock	Reserved	Reserved	Reserved	Jump to Pin 6	DBP
2	Power	Power	Power	Power	Power	Power	Power
3	Ground	Ground	Ground	Ground	Ground	Ground	Ground
4	IBM_A(+)	Reserved	TxD	KeyClock	DBP	Reserved	SOS
5	Reserved	Reserved	RxD	TermData	CTS	D +	Decode
6	IBM_B(-)	SynData	RTS	KeyData	RTS	Jump to Pin 1	Trigger
7	Reserved	Reserved	CTS	TermClock	Reserved	D -	Enable
8	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
9	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
10	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

4

User Preferences

Introduction

If desired, program the digital scanner to perform various functions, or activate different features. This chapter describes each user preference feature and provides the programming bar codes necessary for selecting these features.

The digital scanner ships with the settings shown in the *Table 4-1 on page 4-4* (also see *Appendix A, Standard Default Parameters* for all host device and miscellaneous defaults). If the default values suit requirements, programming is not necessary.

To set feature values, scan a single bar code or a short bar code sequence. The settings are stored in non-volatile memory and are preserved even when the digital scanner is powered down.

Note

Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where the bar code can be seen clearly, and bars and/or spaces are not merging.

If not using a Synapse or USB cable, select a host type (see each host chapter for specific host information) after the power-up beeps sound. This is only necessary upon the first power-up when connected to a new host.

To return all features to default values, scan the **Set All Defaults on page 4-5*. Throughout the programming bar code menus, default values are indicated with asterisks (*****).

* Indicates Default — ***High Volume** — Feature/Option

Scanning Sequence Examples

In most cases, scanning one bar code sets the parameter value. For example, to set the beeper tone to high, scan the **High Frequency** (beeper tone) bar code listed under *Beeper Tone on page 4-6*. The digital scanner issues a fast warble beep and the LED turns green, signifying a successful parameter entry.

Other parameters, such as **Serial Response Time-Out** or **Data Transmission Formats**, require scanning several bar codes. See these parameter descriptions for this procedure.

Errors While Scanning

Unless otherwise specified, to correct an error during a scanning sequence, just re-scan the correct parameter.

User Preferences Parameter Defaults

Table 4-1 lists defaults for user preferences parameters. To change any option, scan the appropriate bar code(s) provided in the User Preferences section beginning on page 4-5.

Note

See *Appendix A, Standard Default Parameters* for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 4-1. User Preferences Default Table

Parameter	Parameter Number	Default	Page Number
User Preferences			
Set Default Parameter		All Defaults	4-5
Parameter Scanning	ECh	Enable	4-5
Beeper Tone	91h	Medium	4-6
Beeper Volume	8Ch	High	4-7
Power Mode	80h	Continuous On	4-7
Time Delay to Low Power Mode	92h	5 Minutes	4-8
Trigger Mode	8Ah	Level	4-9
Decode Session Timeout	88h	9.9 Sec	4-10
Timeout Between Decodes, Same Symbol	89h	0.6 Sec	4-10
Beep After Good Decode	38h	Enable	4-11
Scanstand Session Timeout	F0h, 90h	2 Seconds	4-11

User Preferences

Set Default Parameter

Scan this bar code to return all parameters to the default values listed in *Table A-1 on page A-3*.

***Set All Defaults**

Parameter Scanning

Parameter # ECh

To disable decoding of parameter bar codes, scan the **Disable Parameter Scanning** bar code below. Note that the **Set Defaults** parameter bar code can still be decoded. To enable decoding of parameter bar codes, either scan **Enable Parameter Scanning** or **Set All Defaults**.

***Enable Parameter Scanning**
(01h)

Disable Parameter Scanning
(00h)

Beeper Tone

Parameter # 91h

To select a decode beep frequency (tone), scan the **Low Frequency, Medium Frequency**, or **High Frequency** bar code.

Low Frequency
(02h)

***Medium Frequency**
(Optimum Setting)
(01h)

High Frequency
(00h)

Beeper Volume

Parameter # 8Ch

To select a beeper volume, scan the **Low Volume, Medium Volume**, or **High Volume** bar code.

Low Volume
(02h)

Medium Volume
(01h)

***High Volume**
(00h)

Power Mode

Parameter # 80h

This parameter determines whether or not power remains on after a decode attempt. In reduced power mode, the digital scanner enters into a low power consumption mode to preserve battery life after each decode attempt. In continuous power mode, power remains on after each decode attempt.

***Continuous On**
(00h)

Reduced Power Mode
(01h)

Time Delay to Low Power Mode

Parameter # 92h

Note: This parameter only applies when *Power Mode* is set to **Reduced Power**.

This parameter sets the time the digital scanner remains active after decoding. The digital scanner wakes upon trigger pull or when the host attempts to communicate with the digital scanner.

1 Second
(11h)

5 Seconds
(15h)

1 Minute
(21h)

***5 Minutes**
(25h)

Time Delay to Low Power Mode (continued)

15 Minutes
(2Bh)

1 Hour
(31h)

Trigger Mode

Parameter # 8Ah

Select one of the following trigger modes for the digital scanner:

- **Level** - A trigger pull activates decode processing. Decode processing continues until the bar code is decoded, the trigger is released, or the Decode Session Timeout is reached.
- **Blink** - This trigger mode is used in hands-free (Intellistand) mode. The digital scanner activates decode processing when it detects a bar code in its field of view. Decoding range is reduced in this mode.
- **Host** - A host command issues the triggering signal. The digital scanner interprets an actual trigger pull as a Level triggering option.

***Level**
(00h)

Blink
(07h)

Host
(08h)

Decode Session Timeout

Parameter # 88h

This parameter sets the maximum time decode processing continues during a scan attempt. It is programmable in 0.1 second increments from 0.5 to 9.9 seconds. The default timeout is 9.9 seconds.

To set a Decode Session Timeout, scan the bar code below. Next, scan two numeric bar codes from *Appendix D, Numeric Bar Codes* that correspond to the desired on time. Single digit numbers must have a leading zero. For example, to set a Decode Session Timeout of 0.5 seconds, scan the bar code below, then scan the **0** and **5** bar codes. To correct an error or change the selection, scan **Cancel** on *page D-4*.

Decode Session Timeout

Timeout Between Decodes, Same Symbol

Parameter # 89h

This option is used in hands-free (Intellistand) mode to prevent the beeper from continuously beeping when a symbol is left in the digital scanner's field of view. It is programmable in 0.1 second increments from 0.0 to 9.9 seconds. The default interval is 0.6 seconds.

To select the timeout between decodes for the same symbol, scan the bar code below, then scan two numeric bar codes from *Appendix D, Numeric Bar Codes* that correspond to the desired interval, in 0.1 second increments.

Timeout Between Decodes, Same Symbol

Beep After Good Decode

Parameter # 38h

Scan a bar code below to select whether or not the digital scanner beeps after a good decode. If selecting **Do Not Beep After Good Decode**, the beeper still operates during parameter menu scanning and to indicate error conditions.

***Beep After Good Decode**
(Enable)
(01h)

Do Not Beep After Good Decode
(Disable)
(00h)

Scanstand Session Timeout

Parameter # F0h, 90h

To set the amount of time the digital scanner attempts to decode a bar code in hands-free mode (blink mode), scan the bar code below. Next, scan three numeric bar codes from *Appendix D, Numeric Bar Codes* to select a value between 1 and 255 that represents tenths of a second. Single digit numbers must have a leading zero. For example, to set 0.5 seconds, scan the bar code below, then scan the **0, 0**, **5** bar codes. To correct an error or change the selection, scan **Cancel** on *page D-4*. The default value is 2 seconds.

Scanstand Session Timeout

5

Decoding Preferences

Introduction

If desired, program the digital scanner to perform various functions, or activate different features. This chapter describes digital scanner preference features and provides the programming bar codes for selecting these features.

The digital scanner ships with the settings shown in the *Decoding Preferences Default Table on page 5-4* (also see *Appendix A, Standard Default Parameters* for all host device and miscellaneous defaults). If the default values suit requirements, programming is not necessary.

To set feature values, scan a single bar code or a short bar code sequence. The settings are stored in non-volatile memory and are preserved even when the digital scanner is powered down.

Note: Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where the bar code can be seen clearly, and bars and/or spaces are not merging.

If not using a Synapse or USB cable, select a host type (see each host chapter for specific host information) after the power-up beeps sound. This is only necessary upon the first power-up when connected to a new host.

To return all features to default values, scan the *Set Default Parameter* bar code on page 4-5. Throughout the programming bar code menus, default values are indicated with asterisks (*****).

* Indicates Default — ***Enable Decode Aiming Pattern** — Feature/Option

(02h) — Hex Value

Scanning Sequence Examples

In most cases scanning one bar code sets the parameter value. For example, to disable the decode aiming pattern, scan the **Disable Decode Aiming Pattern** bar code listed under *Decode Aiming Pattern on page 5-5*. The digital scanner issues a fast warble beep and the LED turns green, signifying a successful parameter entry.

Other parameters require scanning several bar codes. See these parameter descriptions for this procedure.

Errors While Scanning

Unless otherwise specified, to correct an error during a scanning sequence, just re-scan the correct parameter.

Decoding Preferences Parameter Defaults

Table 5-1 lists defaults for digital scanner preferences parameters. To change any option, scan the appropriate bar code(s) provided in *Decoding Preferences on page 5-5*.

Note

See *Appendix A, Standard Default Parameters* for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 5-1. Decoding Preferences Default Table

Parameter	Parameter Number	Default	Page Number
Decoding Options			
Decoding Illumination	F0h 2Ah	Enable	5-5
Decode Aiming Pattern	F0h 32h	Enable	5-5

Decoding Preferences

The parameters in this chapter control bar code decoding characteristics.

Decoding Illumination

Parameter # F0h, 2Ah

Selecting Enable Illumination causes the digital scanner to flash illumination to aid decoding. Select Disable Illumination to prevent the digital scanner from using decoding illumination.

Enabling illumination usually results in superior images. The effectiveness of the illumination decreases as the distance to the target increases.

***Enable Decoding Illumination**
(01h)

Disable Decoding Illumination
(00h)

Decode Aiming Pattern

Parameter # F0h, 32h

This parameter only applies when in Decode Mode. Select **Enable Decode Aiming Pattern** to project the aiming pattern during bar code capture, or **Disable Decode Aiming Pattern** to turn the aiming pattern off.

***Enable Decode Aiming Pattern**
(02h)

Disable Decode Aiming Pattern
(00h)

6

Keyboard Wedge Interface

Introduction

This chapter describes how to set up a Keyboard Wedge interface with the digital scanner. With this interface, the digital scanner is connected between the keyboard and host computer, and translates bar code data into keystrokes. The host computer accepts the keystrokes as if they originated from the keyboard. This mode adds bar code reading functionality to a system designed for manual keyboard input. Keyboard keystrokes are simply passed through.

Throughout the programming bar code menus, default values are indicated with asterisks (*****).

* Indicates Default — ***North American** — Feature/Option

Note: Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where the bar code can be seen clearly, and bars and/or spaces are not merging.

Connecting a Keyboard Wedge Interface

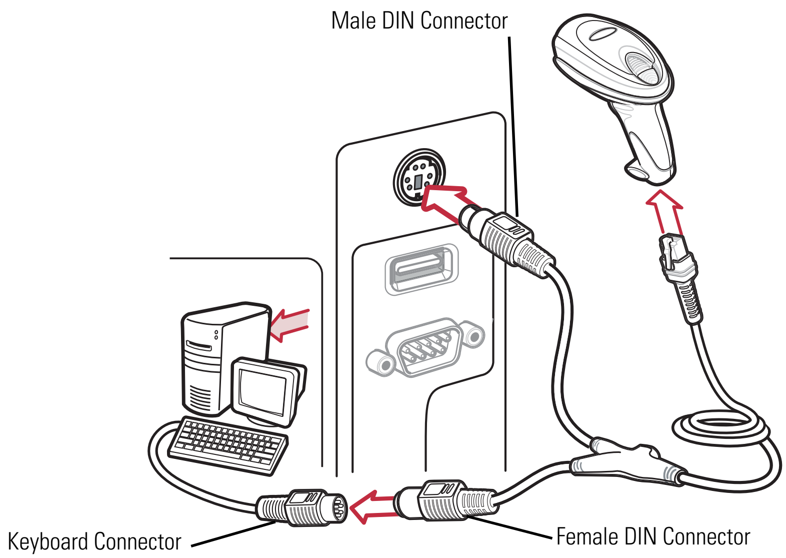


Figure 6-1. Keyboard Wedge Connection with Y-cable

To connect the Keyboard Wedge interface Y-cable:

Note: Interface cables vary depending on configuration. The connectors illustrated in Figure 6-1 are examples only. The connectors may be different than those illustrated, but the steps to connect the scanner remain the same.

1. Turn off the host and unplug the keyboard connector.
2. Attach the modular connector of the Y-cable to the cable interface port on the digital scanner. (See *Installing the Interface Cable on page 1-4*.)

3. Connect the round male DIN host connector of the Y-cable to the keyboard port on the host device.
4. Connect the round female DIN keyboard connector of the Y-cable to the keyboard connector.
5. If needed, attach the optional power supply to the connector in the middle of the Y-cable.
6. Ensure that all connections are secure.
7. Turn on the host system.
8. Select the Keyboard Wedge host type by scanning the appropriate bar code from *Keyboard Wedge Host Types on page 6-5*.
9. To modify any other parameter options, scan the appropriate bar codes in this chapter.

Keyboard Wedge Parameter Defaults

Table 6-1 lists the defaults for Keyboard Wedge host parameters. To change any option, scan the appropriate bar code(s) in the Keyboard Wedge Host Parameters section beginning on page 6-5.

Note

See *Appendix A, Standard Default Parameters* for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 6-1. Keyboard Wedge Host Default Table

Parameter	Default	Page Number
Keyboard Wedge Host Parameters		
Keyboard Wedge Host Type	IBM PC/AT& IBM PC Compatibles	6-5
Country Types (Country Codes)	North American	6-6
Ignore Unknown Characters	Transmit	6-8
Keystroke Delay	No Delay	6-8
Intra-Keystroke Delay	Disable	6-9
Alternate Numeric Keypad Emulation	Disable	6-9
Caps Lock On	Disable	6-10
Caps Lock Override	Disable	6-10
Convert Wedge Data	No Convert	6-11
Function Key Mapping	Disable	6-11
FN1 Substitution	Disable	6-12
Send and Make Break	Send	6-12

Keyboard Wedge Host Parameters

Keyboard Wedge Host Types

Select the Keyboard Wedge host by scanning one of the bar codes below.

IBM PC/AT & IBM PC Compatibles

IBM PS/2 (Model 30)

IBM AT Notebook

IBM XT

NCR 7052

Keyboard Wedge Country Types (Country Codes)

Scan the bar code corresponding to the keyboard type. If the keyboard type is not listed, see *Alternate Numeric Keypad Emulation on page 6-9*.

***North American**

German Windows

French Windows

French Canadian Windows 95/98

French Canadian Windows XP/2000

Spanish Windows

Keyboard Wedge Country Types (continued)

Italian Windows

Swedish Windows

UK English Windows

Japanese Windows

Portuguese-Brazilian Windows

Ignore Unknown Characters

Unknown characters are characters the host does not recognize. When **Send Bar Codes With Unknown Characters** is selected, all bar code data is sent except for unknown characters, and no error beeps sound on the digital scanner. When **Do Not Send Bar Codes With Unknown Characters** is selected, bar code data is sent up to the first unknown character, then the digital scanner issues an error beep.

***Send Bar Codes with Unknown Characters (Transmit)**

Do Not Send Bar Codes with Unknown Characters

Keystroke Delay

This is the delay in milliseconds between emulated keystrokes. Scan a bar code below to increase the delay when hosts require a slower transmission of data.

***No Delay**

Medium Delay (20 msec)

Long Delay (40 msec)

Intra-Keystroke Delay

When enabled, an additional delay is inserted between each emulated key depression and release. This sets the Keystroke Delay parameter to a minimum of 5 msec as well.

Enable

***Disable**

Alternate Numeric Keypad Emulation

This allows emulation of most other country keyboard types not listed in *Keyboard Wedge Country Types (Country Codes) on page 6-6* in a Microsoft® operating system environment.

Enable Alternate Numeric Keypad

***Disable Alternate Numeric Keypad**

Caps Lock On

When enabled, the digital scanner emulates keystrokes as if the Caps Lock key is always pressed.

Enable Caps Lock On

***Disable Caps Lock On**

Caps Lock Override

When enabled, on AT or AT Notebook hosts, the keyboard ignores the state of the Caps Lock key. Therefore, an ‘A’ in the bar code is sent as an ‘A’ no matter what the state of the keyboard’s Caps Lock key.

Enable Caps Lock Override

***Disable Caps Lock Override**

Note

If both Caps Lock On and Caps Lock Override are enabled, Caps Lock Override takes precedence.

Convert Wedge Data

When enabled, the digital scanner converts all bar code data to the selected case.

Convert to Upper Case

Convert to Lower Case

***No Convert**

Function Key Mapping

ASCII values under 32 are normally sent as control key sequences (see *Table 6-2 on page 6-15*). When this parameter is enabled, the keys in bold are sent in place of the standard key mapping. Table entries that do not have a bold entry remain the same whether or not this parameter is enabled.

Enable

***Disable**

FN1 Substitution

When this is enabled, the digital scanner replaces FN1 characters in an EAN128 bar code with a keystroke chosen by the user (see *FN1 Substitution Values on page 14-8*).

Enable

***Disable**

Send Make and Break

When enabled, the scan codes for releasing a key are not sent.

***Send Make and Break Scan Codes**

Send Make Scan Code Only

Keyboard Maps

The following keyboard maps are provided for prefix/suffix keystroke parameters. To program the prefix/suffix values, see the bar codes on page 14-6.

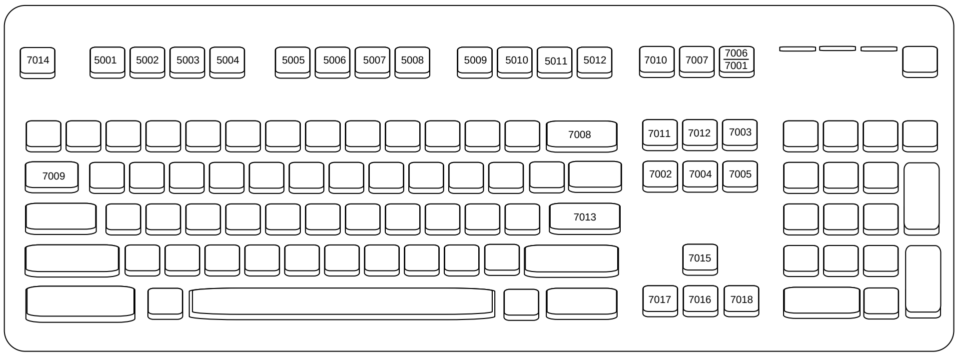


Figure 6-2. IBM PS2 Type Keyboard

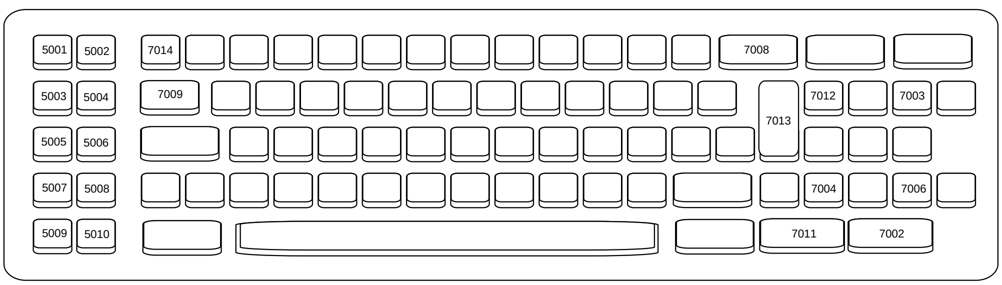


Figure 6-3. IBM PC/XT

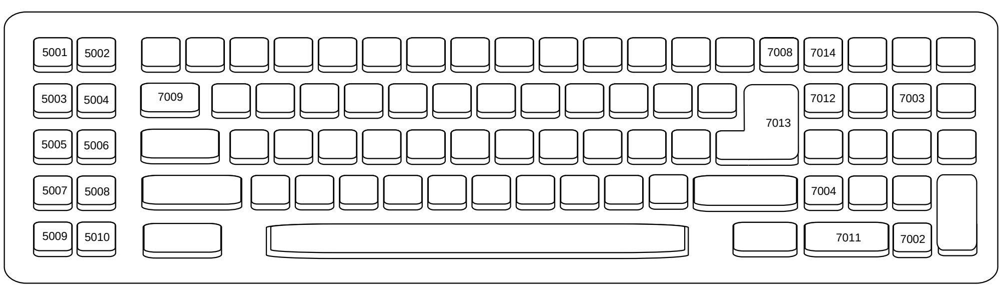


Figure 6-4. IBM PC/AT

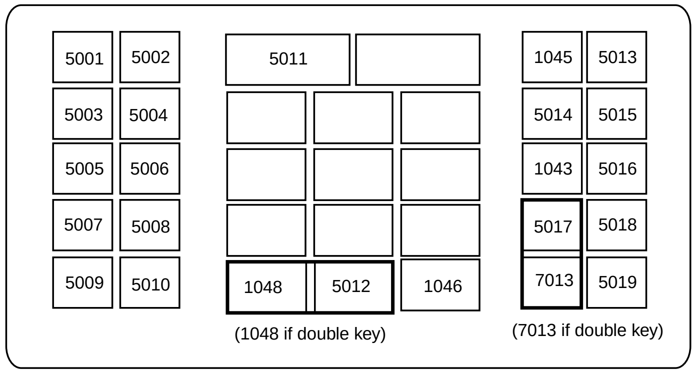


Figure 6-5. NCR 7052 32-KEY

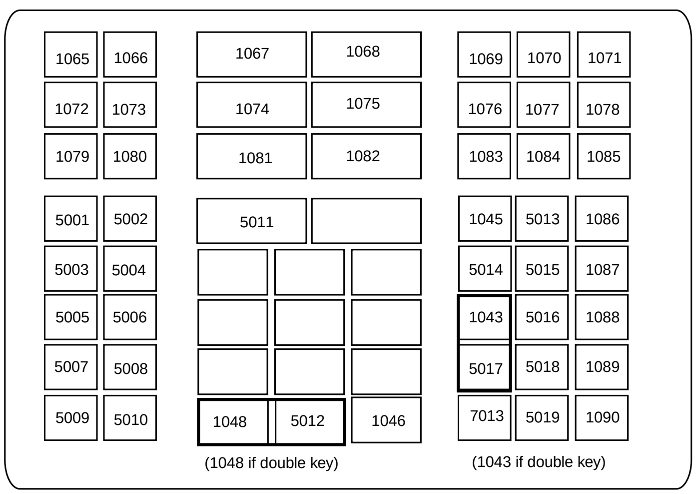


Figure 6-6. NCR 7052 58-KEY

ASCII Character Set for Keyboard Wedge

Note: Code 39 Full ASCII interprets the bar code special character ($ + % /) preceding a Code 39 character and assigns an ASCII character value to the pair. For example, when Code 39 Full ASCII is enabled and **+B** is scanned, it is interpreted as **b**, **%J** as **?**, and **%V** as **@**. Scanning **ABC%I** outputs the keystroke equivalent of **ABC >.**

Table 6-2. Keyboard Wedge ASCII Character Set

ASCII Value	Full ASCII Code 39 Encode Char.acter	Keystroke
1001	$A	CTRL A
1002	$B	CTRL B
1003	$C	CTRL C
1004	$D	CTRL D
1005	$E	CTRL E
1006	$F	CTRL F
1007	$G	CTRL G
1008	$H	CTRL H/**BACKSPACE**[1]
1009	$I	CTRL I/**HORIZONTAL TAB**[1]
1010	$J	CTRL J
1011	$K	CTRL K
1012	$L	CTRL L
1013	$M	CTRL M/**ENTER**[1]
1014	$N	CTRL N
1015	$O	CTRL O
1016	$P	CTRL P
1017	$Q	CTRL Q
1018	$R	CTRL R
1019	$S	CTRL S
1020	$T	CTRL T
1021	$U	CTRL U
1022	$V	CTRL V
1023	$W	CTRL W
1024	$X	CTRL X
1025	$Y	CTRL Y
1026	$Z	CTRL Z
1027	%A	CTRL [/**ESC**[1]

[1]The keystroke in bold is sent only if the “Function Key Mapping” is enabled. Otherwise, the unbolded keystroke is sent.

Table 6-2. Keyboard Wedge ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Char.acter	Keystroke
1028	%B	CTRL \
1029	%C	CTRL]
1030	%D	CTRL 6
1031	%E	CTRL -
1032	Space	Space
1033	/A	!
1034	/B	“
1035	/C	#
1036	/D	$
1037	/E	%
1038	/F	&
1039	/G	‘
1040	/H	(
1041	/I	)
1042	/J	*
1043	/K	+
1044	/L	,
1045	-	-
1046	.	.
1047	/O	/
1048	0	0
1049	1	1
1050	2	2
1051	3	3
1052	4	4
1053	5	5
1054	6	6
1055	7	7
1056	8	8
1057	9	9
1058	/Z	:
1059	%F	;
1060	%G	<

[1]The keystroke in bold is sent only if the “Function Key Mapping” is enabled. Otherwise, the unbolded keystroke is sent.

Table 6-2. Keyboard Wedge ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Char.acter	Keystroke
1061	%H	=
1062	%I	>
1063	%J	?
1064	%V	@
1065	A	A
1066	B	B
1067	C	C
1068	D	D
1069	E	E
1070	F	F
1071	G	G
1072	H	H
1073	I	I
1074	J	J
1075	K	K
1076	L	L
1077	M	M
1078	N	N
1079	O	O
1080	P	P
1081	Q	Q
1082	R	R
1083	S	S
1084	T	T
1085	U	U
1086	V	V
1087	W	W
1088	X	X
1089	Y	Y
1090	Z	Z
1091	%K	[
1092	%L	\
1093	%M	]

[1]The keystroke in bold is sent only if the “Function Key Mapping” is enabled. Otherwise, the unbolded keystroke is sent.

Table 6-2. Keyboard Wedge ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Char.acter	Keystroke
1094	%N	^
1095	%O	_
1096	%W	‘
1097	+A	a
1098	+B	b
1099	+C	c
1100	+D	d
1101	+E	e
1102	+F	f
1103	+G	g
1104	+H	h
1105	+I	i
1106	+J	j
1107	+K	k
1108	+L	l
1109	+M	m
1110	+N	n
1111	+O	o
1112	+P	p
1113	+Q	q
1114	+R	r
1115	+S	s
1116	+T	t
1117	+U	u
1118	+V	v
1119	+W	w
1120	+X	x
1121	+Y	y
1122	+Z	z
1123	%P	{
1124	%Q	|
1125	%R	}
1126	%S	~

[1]The keystroke in bold is sent only if the “Function Key Mapping” is enabled. Otherwise, the unbolded keystroke is sent.

Table 6-3. Keyboard Wedge ALT Key Character Set

ALT Keys	Keystroke
2065	ALT A
2066	ALT B
2067	ALT C
2068	ALT D
2069	ALT E
2070	ALT F
2071	ALT G
2072	ALT H
2073	ALT I
2074	ALT J
2075	ALT K
2076	ALT L
2077	ALT M
2078	ALT N
2079	ALT O
2080	ALT P
2081	ALT Q
2082	ALT R
2083	ALT S
2084	ALT T
2085	ALT U
2086	ALT V
2087	ALT W
2088	ALT X
2089	ALT Y
2090	ALT Z

Table 6-4. Keyboard Wedge GUI Key Character Set

GUI Keys	Keystrokes
3000	Right Control Key
3048	GUI 0
3049	GUI 1
3050	GUI 2
3051	GUI 3
3052	GUI 4

Table 6-4. Keyboard Wedge GUI Key Character Set (Continued)

GUI Keys	Keystrokes
3053	GUI 5
3054	GUI 6
3055	GUI 7
3056	GUI 8
3057	GUI 9
3065	GUI A
3066	GUI B
3067	GUI C
3068	GUI D
3069	GUI E
3070	GUI F
3071	GUI G
3072	GUI H
3073	GUI I
3074	GUI J
3075	GUI K
3076	GUI L
3077	GUI M
3078	GUI N
3079	GUI O
3080	GUI P
3081	GUI Q
3082	GUI R
3083	GUI S
3084	GUI T
3085	GUI U
3086	GUI V
3087	GUI W
3088	GUI X
3089	GUI Y
3090	GUI Z

Table 6-5. Keyboard Wedge F Key Character Set

F Keys	Keystroke
5001	F1
5002	F2
5003	F3
5004	F4
5005	F5
5006	F6
5007	F7
5008	F8
5009	F9
5010	F10
5011	F11
5012	F12
5013	F13
5014	F14
5015	F15
5016	F16
5017	F17
5018	F18
5019	F19
5020	F20
5021	F21
5022	F22
5023	F23
5024	F24

Table 6-6. Keyboard Wedge Numeric Keypad Character Set

Numeric Keypad	Keystroke
6042	*
6043	+
6044	undefined
6045	-
6046	.
6047	/
6048	0
6049	1

Table 6-6. Keyboard Wedge Numeric Keypad Character Set (Continued)

Numeric Keypad	Keystroke
6050	2
6051	3
6052	4
6053	5
6054	6
6055	7
6056	8
6057	9
6058	Enter
6059	Num Lock

Table 6-7. Keyboard Wedge Extended Keypad Character Set

Extended Keypad	Keystroke
7001	Break
7002	Delete
7003	Pg Up
7004	End
7005	Pg Dn
7006	Pause
7007	Scroll Lock
7008	Backspace
7009	Tab
7010	Print Screen
7011	Insert
7012	Home
7013	Enter
7014	Escape
7015	Up Arrow
7016	Dn Arrow
7017	Left Arrow
7018	Right Arrow

7

RS-232 Interface

Introduction

This chapter describes how to set up the digital scanner with an RS-232 host. The RS-232 interface is used to connect the digital scanner to point-of-sale devices, host computers, or other devices with an available RS-232 port (e.g., com port).

If the host is not listed in Table 7-2, refer to the documentation for the host device to set communication parameters to match the host.

Note: The digital scanner uses TTL RS-232 signal levels, which interface with most system architectures. For system architectures requiring RS-232C signal levels, Symbol offers different cables providing TTL-to-RS-232C conversion. Contact the Symbol Support Center for more information.

Throughout the programming bar code menus, default values are indicated with asterisks (*****).

* Indicates Default — ***Baud Rate 57,600** — Feature/Option

Note: Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where the bar code can be seen clearly, and bars and/or spaces are not merging.

Connecting an RS-232 Interface

This connection is made directly from the digital scanner to the host computer.

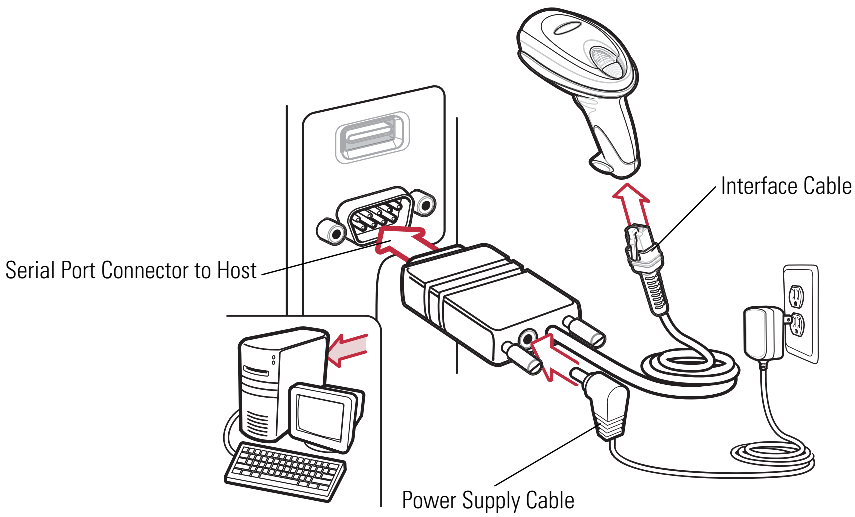


Figure 7-1. RS-232 Direct Connection

Note

Interface cables vary depending on configuration. The connectors illustrated in Figure 7-1 are examples only. The connectors may be different than those illustrated, but the steps to connect the scanner remain the same.

1. Attach the modular connector of the RS-232 interface cable to the cable interface port on the digital scanner (see *Installing the Interface Cable on page 1-4*).
2. Connect the other end of the RS-232 interface cable to the serial port on the host.
3. Connect the power supply to the serial connector end of the RS-232 interface cable. Plug the power supply into an appropriate outlet.
4. Select the RS-232 host type by scanning the appropriate bar code from *RS-232 Host Types on page 7-8*.
5. To modify any other parameter options, scan the appropriate bar codes in this chapter.

RS-232 Parameter Defaults

Table 7-1 lists the defaults for RS-232 host parameters. To change any option, scan the appropriate bar code(s) provided in the RS-232 Host Parameters section beginning on page 7-6.

Note: See *Appendix A, Standard Default Parameters* for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 7-1. RS-232 Host Default Table

Parameter	Default	Page Number
RS-232 Host Parameters		
RS-232 Host Types	Standard	7-8
Baud Rate	9600	7-9
Parity Type	None	7-11
Stop Bit Select	1 Stop Bit	7-12
Data Bits	8-Bit	7-12
Check Receive Errors	Enable	7-13
Hardware Handshaking	None	7-14
Software Handshaking	None	7-16
Host Serial Response Time-out	2 Sec	7-17
RTS Line State	Low RTS	7-18
Beep on <BEL>	Disable	7-18
Intercharacter Delay	0 msec	7-19
Nixdorf Beep/LED Options	Normal Operation	7-20
Ignore Unknown Characters	Send Bar Code	7-20

RS-232 Host Parameters

Various RS-232 hosts are set up with their own parameter default settings (Table 7-2). Selecting standard, ICL, Fujitsu, Wincor-Nixdorf Mode A, Wincor-Nixdorf Mode B, OPOS/JPOS, Olivetti, or Omron sets the defaults listed below.

Table 7-2. Terminal Specific RS-232

Parameter	Standard (Default)	ICL	Fujitsu	Wincor-Nixdorf Mode A	Wincor-Nixdorf Mode B/OPOS/JPOS	Olivetti	Omron
Transmit Code ID	No	Yes	Yes	Yes	Yes	Yes	Yes
Data Transmission Format	Data as is	Data/Suffix	Data/Suffix	Data/Suffix	Data/Suffix	Prefix/Data/ Suffix	Data/Suffix
Suffix	CR/LF (7013)	CR (1013)	CR (1013)	CR (1013)	CR (1013)	ETX (1002)	CR (1013)
Baud Rate	9600	9600	9600	9600	9600	9600	9600
Parity	None	Even	None	Odd	Odd	Even	None
Hardware Handshaking	None	RTS/CTS Option 3	None	RTS/CTS Option 3	RTS/CTS Option 3	None	None
Software Handshaking	None	None	None	None	None	Ack/Nak	None
Serial Response Time-out	2 Sec.	9.9 Sec.	2 Sec.	9.9 Sec.	9.9 Sec.	9.9 Sec.	9.9 Sec.
Stop Bit Select	One	One	One	One	One	One	One
ASCII Format	8-Bit	8-Bit	8-Bit	8-Bit	8-Bit	7-Bit	8-Bit
Beep On <BEL>	Disable	Disable	Disable	Disable	Disable	Disable	Disable
RTS Line State	Low	High	Low	Low	Low = No data to send	Low	High
Prefix	None	None	None	None	None	STX (1003)	None

*In the Nixdorf Mode B, if CTS is Low, scanning is disabled. When CTS is High, the user can scan bar codes.

**If Nixdorf Mode B is scanned without the digital scanner connected to the proper host, it may appear unable to scan. If this happens, scan a different RS-232 host type within 5 seconds of cycling power to the digital scanner.

RS-232 Host Parameters (continued)

Selecting ICL, Fujitsu, Wincor-Nixdorf Mode A, Wincor-Nixdorf Mode B, OPOS/JPOS, Olivetti, or Omron enables the transmission of code ID characters listed in Table 7-3. These code ID characters are not programmable and are separate from the Transmit Code ID feature. Do not enable the Transmit Code ID feature for these terminals.

Table 7-3. Terminal Specific Code ID Characters

	ICL	Fujitsu	Wincor-Nixdorf Mode A	Wincor-Nixdorf Mode B/ OPOS/JPOS	Olivetti	Omron
UPC-A	A	A	A	A	A	A
UPC-E	E	E	C	C	C	E
EAN-8/JAN-8	FF	FF	B	B	B	FF
EAN-13/JAN-13	F	F	A	A	A	F
Code 39	C <len>	None	M	M	M <len>	C <len>
Codabar	N <len>	None	N	N	N <len>	N <len>
Code 128	L <len>	None	K	K	K <len>	L <len>
I 2 of 5	I <len>	None	I	I	I <len>	I <len>
Code 93	None	None	L	L	L <len>	None
D 2 of 5	H <len>	None	H	H	H <len>	H <len>
UCC/EAN 128	L <len>	None	P	P	P <len>	L <len>
MSI	None	None	O	O	O <len>	None
Bookland EAN	F	F	A	A	A	F
Trioptic	None	None	None	None	None	None
Code 11	None	None	None	None	None	None
IATA	H<len>	None	H	H	None	None
Code 32	None	None	None	None	None	None

RS-232 Host Types

To select an RS-232 host interface, scan one of the following bar codes.

Standard RS-232

ICL RS-232

Wincor-Nixdorf RS-232 Mode A

Wincor-Nixdorf RS-232 Mode B

Olivetti ORS4500

Omron

RS-232 Host Types (continued)

OPOS/JPOS

Fujitsu RS-232

Baud Rate

Baud rate is the number of bits of data transmitted per second. Set the digital scanner's baud rate to match the baud rate setting of the host device. Otherwise, data may not reach the host device or may reach it in distorted form.

Baud Rate 600

Baud Rate 1200

Baud Rate 2400

Baud Rate 4800

Baud Rate (continued)

***Baud Rate 9600**

Baud Rate 19,200

Baud Rate 38,400

Baud Rate 57,600

Parity

A parity check bit is the most significant bit of each ASCII coded character. Select the parity type according to host device requirements.

- Select **Odd** parity and the parity bit value is set to 0 or 1, based on data, to ensure that an odd number of 1 bits are contained in the coded character.
- Select **Even** parity and the parity bit value is set to 0 or 1, based on data, to ensure that an even number of 1 bits are contained in the coded character.
- Select **Mark** parity and the parity bit is always 1.
- Select **Space** parity and the parity bit is always 0.
- Select **None** when no parity bit is required.

Odd

Even

Mark

Space

***None**

Stop Bit Select

The stop bit(s) at the end of each transmitted character marks the end of transmission of one character and prepares the receiving device for the next character in the serial data stream. The number of stop bits selected (one or two) depends on the number the receiving terminal is programmed to accommodate. Set the number of stop bits to match host device requirements.

***1 Stop Bit**

2 Stop Bits

Data Bits

This parameter allows the digital scanner to interface with devices requiring a 7-bit or 8-bit ASCII protocol.

7-Bit

***8-Bit**

Check Receive Errors

Select whether or not the parity, framing, and overrun of received characters are checked. The parity value of received characters is verified against the parity parameter selected above.

***Check For Received Errors**

Do Not Check For Received Errors

Hardware Handshaking

The data interface consists of an RS-232 port designed to operate either with or without the hardware handshaking lines, *Request to Send* (RTS), and *Clear to Send* (CTS).

If Standard RTS/CTS handshaking is not selected, scan data is transmitted as it becomes available. If Standard RTS/CTS handshaking is selected, scan data is transmitted according to the following sequence:

- The digital scanner reads the CTS line for activity. If CTS is asserted, the digital scanner waits up to Host Serial Response Time-out for the host to de-assert the CTS line. If, after Host Serial Response Time-out (default), the CTS line is still asserted, the digital scanner sounds a transmit error, and any scanned data is lost.
- When the CTS line is de-asserted, the digital scanner asserts the RTS line and waits up to Host Serial Response Time-out for the host to assert CTS. When the host asserts CTS, data is transmitted. If, after Host Serial Response Time-out (default), the CTS line is not asserted, the digital scanner sounds a transmit error, and discards the data.
- When data transmission is complete, the digital scanner de-asserts RTS 10 msec after sending the last character.
- The host should respond by negating CTS. The digital scanner checks for a de-asserted CTS upon the next transmission of data.

During the transmission of data, the CTS line should be asserted. If CTS is deasserted for more than 50 ms between characters, the transmission is aborted, the digital scanner sounds a transmission error, and the data is discarded.

If the above communication sequence fails, the digital scanner issues an error indication. In this case, the data is lost and must be rescanned.

If Hardware Handshaking and Software Handshaking are both enabled, Hardware Handshaking takes precedence.

Note

The DTR signal is jumpered to the active state.

- **None**: Scan the bar code below if no Hardware Handshaking is desired.
- **Standard RTS/CTS**: Scan the bar code below to select Standard RTS/CTS Hardware Handshaking.
- **RTS/CTS Option 1**: When RTS/CTS Option 1 is selected, the digital scanner asserts RTS before transmitting and ignores the state of CTS. The digital scanner de-asserts RTS when the transmission is complete.
- **RTS/CTS Option 2**: When Option 2 is selected, RTS is always high or low (user-programmed logic level). However, the digital scanner waits for CTS to be asserted before transmitting data. If CTS is not asserted within Host Serial Response Time-out (default), the digital scanner issues an error indication and discards the data.
- **RTS/CTS Option 3**: When Option 3 is selected, the digital scanner asserts RTS prior to any data transmission, regardless of the state of CTS. The digital scanner waits up to Host Serial Response Time-out (default) for CTS to be asserted. If CTS is not asserted during this time, the digital scanner issues an error indication and discards the data. The digital scanner de-asserts RTS when transmission is complete.

Hardware Handshaking (continued)

*None

Standard RTS/CTS

RTS/CTS Option 1

RTS/CTS Option 2

RTS/CTS Option 3

Software Handshaking

This parameter offers control of the data transmission process in addition to, or instead of, that offered by hardware handshaking. There are five options.

If Software Handshaking and Hardware Handshaking are both enabled, Hardware Handshaking takes precedence.

- **None**: When this option is selected, data is transmitted immediately. No response is expected from host.
- **ACK/NAK**: When this option is selected, after transmitting data, the digital scanner expects either an ACK or NAK response from the host. When a NAK is received, the digital scanner transmits the same data again and waits for either an ACK or NAK. After three unsuccessful attempts to send data when NAKs are received, the digital scanner issues an error indication and discards the data.

  The digital scanner waits up to the programmable Host Serial Response Time-out to receive an ACK or NAK. If the digital scanner does not get a response in this time, it issues an error indication and discards the data. There are no retries when a time-out occurs.
- **ENQ**: hen this option is selected, the digital scanner waits for an ENQ character from the host before transmitting data. If an ENQ is not received within the Host Serial Response Time-out, the digital scanner issues an error indication and discards the data. The host must transmit an ENQ character at least every Host Serial Response Time-out to prevent transmission errors.
- **ACK/NAK with ENQ**: This combines the two previous options. For re-transmissions of data, due to a NAK from the host, an additional ENQ is not required.
- **XON/XOFF**: An XOFF character turns the digital scanner transmission off until the digital scanner receives an XON character. There are two situations for XON/XOFF:
  - XOFF is received before the digital scanner has data to send. When the digital scanner has data to send, it waits up to Host Serial Response Time-out for an XON character before transmission. If the XON is not received within this time, the digital scanner issues an error indication and discards the data.
  - XOFF is received during a transmission. Data transmission then stops after sending the current byte. When the digital scanner receives an XON character, it sends the rest of the data message. The digital scanner waits up to 30 seconds for the XON.

***None**

ACK/NAK

ENQ

Software Handshaking (continued)

ACK/NAK with ENQ

XON/XOFF

Host Serial Response Time-out

This parameter specifies how long the digital scanner waits for an ACK, NAK, or CTS before determining that a transmission error has occurred. This only applies when in one of the ACK/NAK Software Handshaking modes, or RTS/CTS Hardware Handshaking option.

***Minimum: 2 Sec**

Low: 2.5 Sec

Medium: 5 Sec

High: 7.5 Sec

Host Serial Response Time-out (continued)

Maximum: 9.9 Sec

RTS Line State

This parameter sets the idle state of the Serial Host RTS line. Scan a bar code below to select **Low RTS** or **High RTS** line state.

*Host: Low RTS

Host: High RTS

Beep on <BEL>

When this parameter is enabled, the digital scanner issues a beep when a <BEL> character is detected on the RS-232 serial line. <BEL> is issued to gain a user's attention to an illegal entry or other important event.

Beep On <BEL> Character
(Enable)

*Do Not Beep On <BEL> Character
(Disable)

Intercharacter Delay

This parameter specifies the intercharacter delay inserted between character transmissions.

***Minimum: 0 msec**

Low: 25 msec

Medium: 50 msec

High: 75 msec

Maximum: 99 msec

Nixdorf Beep/LED Options

When Nixdorf Mode B is selected, this indicates when the digital scanner should beep and turn on its LED after a decode.

***Normal Operation**
(Beep/LED immediately after decode)

Beep/LED After Transmission

Beep/LED After CTS Pulse

Ignore Unknown Characters

Unknown characters are characters the host does not recognize. When **Send Bar Codes with Unknown Characters** is selected, all bar code data is send except for unknown characters, and no error beeps sound on the digital scanner. When **Do Not Send Bar Codes With Unknown Characters** is selected, bar code data is sent up to the first unknown character and then an error beep will sound on the digital scanner.

***Send Bar Code**
(with unknown characters)

Do Not Send Bar Codes
(with unknown characters)

ASCII Character Set for RS-232

The values in Table 7-4 can be assigned as prefixes or suffixes for ASCII character data transmission.

Table 7-4. Prefix/Suffix Values

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1000	%U	NUL
1001	$A	SOH
1002	$B	STX
1003	$C	ETX
1004	$D	EOT
1005	$E	ENQ
1006	$F	ACK
1007	$G	BELL
1008	$H	BCKSPC
1009	$I	HORIZ TAB
1010	$J	LF/NW LN
1011	$K	VT
1012	$L	FF
1013	$M	CR/ENTER
1014	$N	SO
1015	$O	SI
1016	$P	DLE
1017	$Q	DC1/XON
1018	$R	DC2
1019	$S	DC3/XOFF
1020	$T	DC4
1021	$U	NAK
1022	$V	SYN
1023	$W	ETB
1024	$X	CAN
1025	$Y	EM
1026	$Z	SUB
1027	%A	ESC
1028	%B	FS
1029	%C	GS
1030	%D	RS
1031	%E	US
1032	Space	Space

Table 7-4. Prefix/Suffix Values (Continued)

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1033	/A	!
1034	/B	"
1035	/C	#
1036	/D	$
1037	/E	%
1038	/F	&
1039	/G	‘
1040	/H	(
1041	/I	)
1042	/J	*
1043	/K	+
1044	/L	,
1045	-	-
1046	.	.
1047	/O	/
1048	0	0
1049	1	1
1050	2	2
1051	3	3
1052	4	4
1053	5	5
1054	6	6
1055	7	7
1056	8	8
1057	9	9
1058	/Z	:
1059	%F	;
1060	%G	<
1061	%H	=
1062	%I	>
1063	%J	?
1064	%V	@
1065	A	A
1066	B	B
1067	C	C

Table 7-4. Prefix/Suffix Values (Continued)

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1068	D	D
1069	E	E
1070	F	F
1071	G	G
1072	H	H
1073	I	I
1074	J	J
1075	K	K
1076	L	L
1077	M	M
1078	N	N
1079	O	O
1080	P	P
1081	Q	Q
1082	R	R
1083	S	S
1084	T	T
1085	U	U
1086	V	V
1087	W	W
1088	X	X
1089	Y	Y
1090	Z	Z
1091	%K	[
1092	%L	\
1093	%M	]
1094	%N	^
1095	%O	_
1096	%W	`
1097	+A	a
1098	+B	b
1099	+C	c
1100	+D	d
1101	+E	e
1102	+F	f

Table 7-4. Prefix/Suffix Values (Continued)

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1103	+G	g
1104	+H	h
1105	+I	i
1106	+J	j
1107	+K	k
1108	+L	l
1109	+M	m
1110	+N	n
1111	+O	o
1112	+P	p
1113	+Q	q
1114	+R	r
1115	+S	s
1116	+T	t
1117	+U	u
1118	+V	v
1119	+W	w
1120	+X	x
1121	+Y	y
1122	+Z	z
1123	%P	{
1124	%Q	|
1125	%R	}
1126	%S	~
1127		Undefined
7013		ENTER

8

USB Interface

Introduction

This chapter describes how to set up the digital scanner with a USB host. The digital scanner connects directly to a USB host, or a powered USB hub, and is powered by it. No additional power supply is required.

Throughout the programming bar code menus, default values are indicated with asterisks (*).

* Indicates Default ***North American Standard USB Keyboard** Feature/Option

Note: Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where the bar code can be seen clearly, and bars and/or spaces are not merging.

Connecting a USB Interface

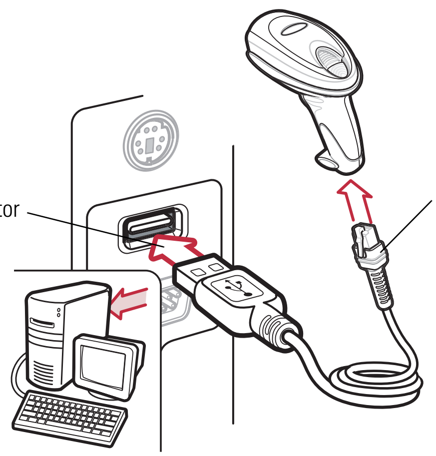


Figure 8-1. USB Connection

The digital scanner connects with USB-capable hosts including:

- Desktop PCs and notebooks
- Apple™ iMac, G4, iBooks (North America only)
- IBM SurePOS terminals
- Sun, IBM, and other network computers that support more than one keyboard.

The following operating systems support the digital scanner through USB:

- Windows® 98, 2000, ME, XP
- MacOS 8.5 and above
- IBM 4690 OS.

The digital scanner also interfaces with other USB hosts which support USB Human Interface Devices (HID). For more information on USB technology, hosts, and peripheral devices, visit *www.symbol.com/usb*.

To set up the digital scanner:

Note

Interface cables vary depending on configuration. The connectors illustrated in Figure 8-1 are examples only. The connectors may be different than those illustrated, but the steps to connect the scanner remain the same.

1. Connect the modular connector of the USB interface cable to the cable interface port on the digital scanner (see *Installing the Interface Cable on page 1-4*).
2. Plug the series A connector in the USB host or hub, or plug the Plus Power connector in an available port of the IBM SurePOS terminal.
3. Select the USB device type by scanning the appropriate bar code from *USB Device Type on page 8-5*.
4. On first installation when using Windows, the software prompts to select or install the Human Interface Device driver. To install this driver, provided by Windows, click *Next* through all the choices and click *Finished* on the last choice. The digital scanner powers up during this installation.
5. To modify any other parameter options, scan the appropriate bar codes in this chapter.

If problems occur with the system, see *Troubleshooting on page 3-3*.

USB Parameter Defaults

Table 8-1 lists the defaults for USB host parameters. To change any option, scan the appropriate bar code(s) provided in the Parameter Descriptions section beginning on page 8-5.

Note

See *Appendix A, Standard Default Parameters* for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 8-1. USB Host Default Table

Parameter	Default	Page Number
USB Host Parameters		
USB Device Type	HID Keyboard Emulation	8-5
USB Country Keyboard Types (Country Codes)	North American	8-6
USB Keystroke Delay	No Delay	8-8
USB CAPS Lock Override	Disable	8-8
USB Ignore Unknown Characters	Enable	8-9
Emulate Keypad	Disable	8-9
USB FN1 Substitution	Disable	8-10
Function Key Mapping	Disable	8-10
Simulated Caps Lock	Disable	8-11
Convert Case	None	8-11

USB Host Parameters

USB Device Type

Select the desired USB device type.

Note: When changing USB Device Types, the digital scanner automatically resets. The digital scanner issues the standard startup beep sequences.

***HID Keyboard Emulation**

IBM Table Top USB

IBM Hand-Held USB

USB OPOS Handheld

USB Country Keyboard Types (Country Codes)

Scan the bar code corresponding to the keyboard type. This setting applies only to the USB HID Keyboard Emulation device.

Note: When changing USB country keyboard types the digital scanner automatically resets. The digital scanner issues the standard startup beep sequences.

***North American Standard USB Keyboard**

German Windows

French Windows

French Canadian Windows 95/98

French Canadian Windows 2000/XP

USB Country Keyboard Types (continued)

Spanish Windows

Italian Windows

Swedish Windows

UK English Windows

Japanese Windows (ASCII)

Portuguese-Brazilian Windows

USB Keystroke Delay

This parameter sets the delay, in milliseconds, between emulated keystrokes. Scan a bar code below to increase the delay when hosts require a slower transmission of data.

***No Delay**

Medium Delay (20 msec)

Long Delay (40 msec)

USB CAPS Lock Override

This option applies only to the HID Keyboard Emulation device. When enabled, the case of the data is preserved regardless of the state of the caps lock key. This setting is always enabled for the Japanese, Windows (ASCII) keyboard type and can not be disabled.

Override Caps Lock Key (Enable)

***Do Not Override Caps Lock Key (Disable)**

USB Ignore Unknown Characters

This option applies only to the HID Keyboard Emulation device and IBM device. Unknown characters are characters the host does not recognize. When **Send Bar Codes With Unknown Characters** is selected, all bar code data is sent except for unknown characters, and no error beeps sound. When **Do Not Send Bar Codes With Unknown Characters** is selected, bar codes containing at least one unknown character are not sent to the host, and an error beep sounds.

***Send Bar Codes with Unknown Characters**
(Transmit)

Do Not Send Bar Codes with Unknown Characters
(Disable)

Emulate Keypad

When enabled, all characters are sent as ASCII sequences over the numeric keypad. For example ASCII A would be sent as “ALT make” 0 6 5 “ALT Break”.

***Disable Keypad Emulation**

Enable Keypad Emulation

USB Keyboard FN 1 Substitution

This option applies only to the USB HID Keyboard Emulation device. When enabled, this allows replacement of any FN 1 characters in an EAN 128 bar code with a Key Category and value chosen by the user (see *FN1 Substitution Values on page 14-8* to set the Key Category and Key Value).

Enable

***Disable**

Function Key Mapping

ASCII values under 32 are normally sent as a control-key sequences (see Table 8-2 on page 8-12). When this parameter is enabled, the keys in bold are sent in place of the standard key mapping. Table entries that do not have a bold entry remain the same whether or not this parameter is enabled.

***Disable Function Key Mapping**

Enable Function Key Mapping

Simulated Caps Lock

When enabled, the digital scanner inverts upper and lower case characters on the bar code as if the Caps Lock state is enabled on the keyboard. This inversion is done regardless of the current state of the keyboard's Caps Lock state.

***Disable Simulated Caps Lock**

Enable Simulated Caps Lock

Convert Case

When enabled, the digital scanner converts all bar code data to the selected case.

***No Case Conversion**

Convert All to Upper Case

Convert All to Lower Case

ASCII Character Set for USB

Table 8-2. USB Prefix/Suffix Values

Prefix/ Suffix Value	Full ASCII Code 39 Encode Char.acter	Keystroke
1000	%U	CTRL 2
1001	$A	CTRL A
1002	$B	CTRL B
1003	$C	CTRL C
1004	$D	CTRL D
1005	$E	CTRL E
1006	$F	CTRL F
1007	$G	CTRL G
1008	$H	CTRL H/**BACKSPACE**[1]
1009	$I	CTRL I/**HORIZONTAL TAB**[1]
1010	$J	CTRL J
1011	$K	CTRL K
1012	$L	CTRL L
1013	$M	CTRL M/**ENTER**[1]
1014	$N	CTRL N
1015	$O	CTRL O
1016	$P	CTRL P
1017	$Q	CTRL Q
1018	$R	CTRL R
1019	$S	CTRL S
1020	$T	CTRL T
1021	$U	CTRL U
1022	$V	CTRL V
1023	$W	CTRL W
1024	$X	CTRL X
1025	$Y	CTRL Y
1026	$Z	CTRL Z
1027	%A	CTRL [/**ESC**[1]
1028	%B	CTRL \
1029	%C	CTRL]

[1]The keystroke in bold is sent only if the “Function Key Mapping” is enabled. Otherwise, the unbolded keystroke is sent.

Table 8-2. USB Prefix/Suffix Values (Continued)

Prefix/ Suffix Value	Full ASCII Code 39 Encode Char.acter	Keystroke
1030	%D	CTRL 6
1031	%E	CTRL -
1032	Space	Space
1033	/A	!
1034	/B	“
1035	/C	#
1036	/D	$
1037	/E	%
1038	/F	&
1039	/G	’
1040	/H	(
1041	/I	)
1042	/J	*
1043	/K	+
1044	/L	,
1045	-	-
1046	.	.
1047	/O	/
1048	0	0
1049	1	1
1050	2	2
1051	3	3
1052	4	4
1053	5	5
1054	6	6
1055	7	7
1056	8	8
1057	9	9
1058	/Z	:
1059	%F	;
1060	%G	<
1061	%H	=
1062	%I	>

[1]The keystroke in bold is sent only if the “Function Key Mapping” is enabled. Otherwise, the unbolded keystroke is sent.

Table 8-2. USB Prefix/Suffix Values (Continued)

Prefix/ Suffix Value	Full ASCII Code 39 Encode Char.acter	Keystroke
1063	%J	?
1064	%V	@
1065	A	A
1066	B	B
1067	C	C
1068	D	D
1069	E	E
1070	F	F
1071	G	G
1072	H	H
1073	I	I
1074	J	J
1075	K	K
1076	L	L
1077	M	M
1078	N	N
1079	O	O
1080	P	P
1081	Q	Q
1082	R	R
1083	S	S
1084	T	T
1085	U	U
1086	V	V
1087	W	W
1088	X	X
1089	Y	Y
1090	Z	Z
1091	%K	[
1092	%L	\
1093	%M	]
1094	%N	^
1095	%O	_

[1]The keystroke in bold is sent only if the “Function Key Mapping” is enabled. Otherwise, the unbolded keystroke is sent.

Table 8-2. USB Prefix/Suffix Values (Continued)

Prefix/ Suffix Value	Full ASCII Code 39 Encode Char.acter	Keystroke
1096	%W	`
1097	+A	a
1098	+B	b
1099	+C	c
1100	+D	d
1101	+E	e
1102	+F	f
1103	+G	g
1104	+H	h
1105	+I	i
1106	+J	j
1107	+K	k
1108	+L	l
1109	+M	m
1110	+N	n
1111	+O	o
1112	+P	p
1113	+Q	q
1114	+R	r
1115	+S	s
1116	+T	t
1117	+U	u
1118	+V	v
1119	+W	w
1120	+X	x
1121	+Y	y
1122	+Z	z
1123	%P	{
1124	%Q	|
1125	%R	}
1126	%S	~

[1]The keystroke in bold is sent only if the "Function Key Mapping" is enabled. Otherwise, the unbolded keystroke is sent.

Table 8-3. USB ALT Key Character Set

ALT Keys	Keystroke
2064	ALT 2
2065	ALT A
2066	ALT B
2067	ALT C
2068	ALT D
2069	ALT E
2070	ALT F
2071	ALT G
2072	ALT H
2073	ALT I
2074	ALT J
2075	ALT K
2076	ALT L
2077	ALT M
2078	ALT N
2079	ALT O
2080	ALT P
2081	ALT Q
2082	ALT R
2083	ALT S
2084	ALT T
2085	ALT U
2086	ALT V
2087	ALT W
2088	ALT X
2089	ALT Y
2090	ALT Z

Table 8-4. USB GUI Key Character Set

GUI Key	Keystroke
3000	Right Control Key
3048	GUI 0
3049	GUI 1
3050	GUI 2
3051	GUI 3
3052	GUI 4
3053	GUI 5
3054	GUI 6
3055	GUI 7
3056	GUI 8
3057	GUI 9
3065	GUI A
3066	GUI B
3067	GUI C
3068	GUI D
3069	GUI E
3070	GUI F
3071	GUI G
3072	GUI H
3073	GUI I
3074	GUI J
3075	GUI K
3076	GUI L
3077	GUI M
3078	GUI N
3079	GUI O
3080	GUI P
3081	GUI Q
3082	GUI R
3083	GUI S
3084	GUI T
3085	GUI U
3086	GUI V

Note: GUI Shift Keys - The Apple™ iMac keyboard has an apple key on either side of the space bar. Windows-based systems have a GUI key to the left of the left ALT key, and to the right of the right ALT key.

Table 8-4. USB GUI Key Character Set (Continued)

GUI Key	Keystroke
3087	GUI W
3088	GUI X
3089	GUI Y
3090	GUI Z
Note: GUI Shift Keys - The Apple™ iMac keyboard has an apple key on either side of the space bar. Windows-based systems have a GUI key to the left of the left ALT key, and to the right of the right ALT key.	

Table 8-5. USB F Key Character Set

F Keys	Keystroke
5001	F1
5002	F2
5003	F3
5004	F4
5005	F5
5006	F6
5007	F7
5008	F8
5009	F9
5010	F10
5011	F11
5012	F12
5013	F13
5014	F14
5015	F15
5016	F16
5017	F17
5018	F18
5019	F19
5020	F20
5021	F21
5022	F22
5023	F23
5024	F24

Table 8-6. USB Numeric Keypad Character Set

Numeric Keypad	Keystroke
6042	*
6043	+
6044	undefined
6045	-
6046	.
6047	/
6048	0
6049	1
6050	2
6051	3
6052	4
6053	5
6054	6
6055	7
6056	8
6057	9
6058	Enter
6059	Num Lock

Table 8-7. USB Extended Keypad Character Set

Extended Keypad	Keystroke
7001	Break
7002	Delete
7003	PgUp
7004	End
7005	Pg Dn
7006	Pause
7007	Scroll Lock
7008	Backspace
7009	Tab
7010	Print Screen
7011	Insert
7012	Home
7013	Enter
7014	Escape
7015	Up Arrow
7016	Down Arrow
7017	Left Arrow
7018	Right Arrow

9

IBM 468X/469X Interface

Introduction

This chapter describes how to set up the digital scanner with an IBM 468X/469X host.

Throughout the programming bar code menus, default values are indicated with asterisks (*).

* Indicates Default — ***Disable Convert to Code 39** — Feature/Option

Note: Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where the bar code can be seen clearly, and bars and/or spaces are not merging.

Connecting to an IBM 468X/469X Host

This connection is made directly from the digital scanner to the host interface.

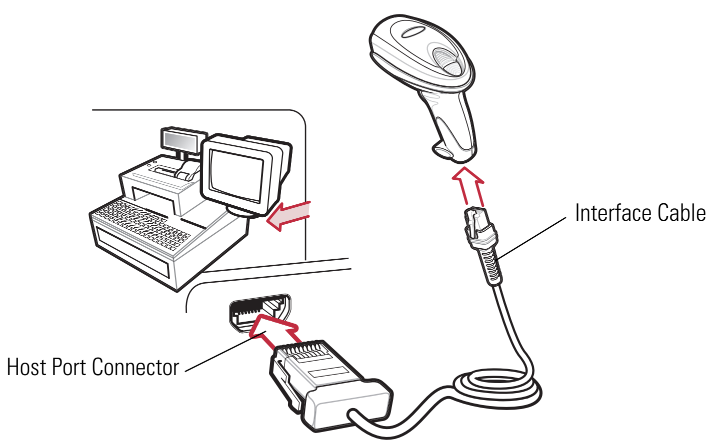


Figure 9-1. IBM Direct Connection

Note: Interface cables vary depending on configuration. The connectors illustrated in Figure 9-1 are examples only. The connectors may be different than those illustrated, but the steps to connect the scanner remain the same.

1. Attach the modular connector of the IBM 46XX interface cable to the cable interface port on the digital scanner (see *Installing the Interface Cable on page 1-4*).
2. Connect the other end of the IBM 46XX interface cable to the appropriate port on the host (typically Port 9).
3. Select the port address by scanning the appropriate bar code from *Port Address on page 9-5*.
4. To modify any other parameter options, scan the appropriate bar codes in this chapter.

Note

The only required configuration is the port address. Other digital scanner parameters are typically controlled by the IBM system.

IBM Parameter Defaults

Table 9-1 lists the defaults for IBM host parameters. To change any option, scan the appropriate bar code(s) provided in the Parameter Descriptions section beginning on page 9-5.

Note

See *Appendix A, Standard Default Parameters* for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 9-1. IBM Host Default Table

Parameter	Default	Page Number
IBM 468X/469X Host Parameters		
Port Address	None Selected	9-5
Convert Unknown to Code 39	Disable	9-6

IBM 468X/469X Host Parameters

Port Address

This parameter sets the IBM 468X/469X port used.

Note: Scanning one of these bar codes enables the RS-485 interface on the digital scanner.

None Selected

Hand-held Scanner Emulation (Port 9B)

Non-IBM Scanner Emulation (Port 5B)

Table-top Scanner Emulation (Port 17)

Convert Unknown to Code 39

Scan a bar code below to enable or disable the conversion of unknown bar code type data to Code 39.

Enable Convert Unknown to Code 39

***Disable Convert Unknown to Code 39**

10

Wand Emulation Interface

Introduction

This chapter describes how to set up the digital scanner with a wand emulation host when Wand Emulation communication is needed. The digital scanner connects to an external wand decoder or to a decoder integrated in a mobile computer or Point-of-Sale (POS) terminal.

In this mode the digital scanner emulates the signal of a digital wand to make it "readable" by a wand decoder.

Throughout the programming bar code menus, default values are indicated with asterisks (*).

* Indicates Default — ***Transmit Unknown Characters*** — Feature/Option

Note Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where the bar code can be seen clearly, and bars and/or spaces are not merging.

Connecting Using Wand Emulation

To perform Wand Emulation, connect the digital scanner to a mobile computer, or a controller which collects the wand data and interprets it for the host.

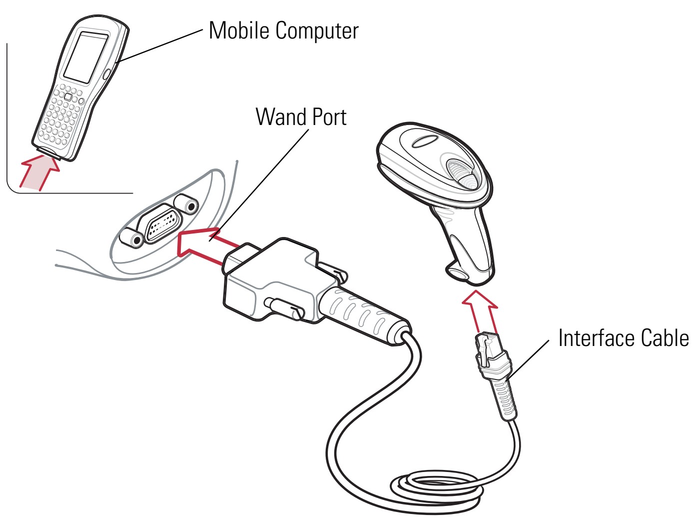


Figure 10-1. Wand Emulation Connection

Note Interface cables vary depending on configuration. The connectors illustrated in Figure 10-1 are examples only. The connectors may be different than those illustrated, but the steps to connect the scanner remain the same.

1. Attach the modular connector of the Wand Emulation interface cable to cable interface port on the digital scanner (see *Installing the Interface Cable on page 1-4*).

2. Connect the other end of the Wand Emulation interface cable to the wand port on the mobile computer or controller.
3. Select the Wand Emulation host type by scanning the appropriate bar code from *Wand Emulation Host Types on page 10-5*.
4. To modify any other parameter options, scan the appropriate bar codes in this chapter.

WARNING **Connect the digital scanner to 5 volt decoders only. Connecting the digital scanner to a 12 volt decoder can damage the digital scanner and invalidate the warranty.**

Wand Emulation Parameter Defaults

Table 10-1 lists the defaults for Wand Emulation host types. To change any option, scan the appropriate bar code(s) provided in *Wand Emulation Host Parameters on page 10-5*.

Note See *Appendix A, Standard Default Parameters* for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 10-1. Wand Emulation Default Table

Parameter	Default	Page Number
Wand Emulation Host Parameters		
Wand Emulation Host Types	Symbol OmniLink Interface Controller	10-5
Leading Margin	80 msec	10-6
Polarity	Bar High/Margin Low	10-7
Ignore Unknown Characters	Ignore	10-8
Convert All Bar Codes to Code 39	Disable	10-8
Convert Code 39 to Full ASCII	Disable	10-9

Wand Emulation Host Parameters

Wand Emulation Host Types

Select a Wand Emulation host by scanning one of the bar codes below.

Symbol OmniLink Interface Controller

Symbol PDT Terminal (MSI)

Symbol PTC Terminal (Telxon)

Leading Margin (Quiet Zone)

Scan a bar code below to select a leading margin duration. A leading margin is the time that precedes the first bar of the scan, (in milliseconds). The minimum allowed value is 80 msec and the maximum is 250 msec. This parameter accommodates older wand decoders which cannot handle short leading margins.

Note

250 msec is the maximum value that this parameter can attain, however, 200 msec is sufficient.

***80 msec**

140 msec

200 msec

Polarity

Polarity determines how the digital scanner's Wand Emulation interface creates the Digitized Barcode Pattern (DBP). DBP is a digital signal that represents the scanned bar code. Different decoders expect the DBP to be in a certain format. The DBP either has the "highs" represent bars and the "lows" represent spaces (margins), or the "highs" represent spaces (margins) and the "lows" represent bars.

Scan the appropriate bar code to select the polarity required by the decoder.

***Bar High/Margin Low**

Bar Low/Margin High

Ignore Unknown Characters

Unknown characters are characters the host does not recognize. When **Send Bar Codes With Unknown Characters** is selected, all bar code data is sent except for unknown characters, and no error beeps sound on the digital scanner. When **Do Not Send Bar Codes With Unknown Characters** is selected, bar codes containing at least one unknown character are not sent to the host, and the digital scanner emits an error beep.

***Send Bar Codes With Unknown Characters**
(Transmit)

Do Not Send Bar Codes With Unknown Characters
(Do Not Transmit)

Convert All Bar Codes to Code 39

By default, the Wand Emulation interface sends data to the attached host in the same symbology that was decoded. This can be a problem for customers with older systems that do not recognize newer symbologies (for example, RSS).

Enabling this parameter ignores the original symbology decoded, and outputs the data as if it were a Code 39 bar code. Any lowercase characters in the original data stream are transmitted as uppercase characters. This also allows ADF Formatting.

If **Ignore Unknown Characters** is enabled, any characters that do not have a corresponding character in the Code 39 symbology set are replaced by a space.

If **Ignore Unknown Characters** is disabled, if any characters that do not have a corresponding Code 39 character are encountered, the digital scanner emits an error beep and no data is transmitted.

Note

ADF Note: By default, the Wand Emulation interface does not allow scanned data to be processed by ADF rules. Enabling this parameter allows the scanned data to be processed by ADF rules (*Chapter 15, Advanced Data Formatting*).

Enable Convert to Code 39 for Wand Host

***Disable Convert to Code 39 for Wand Host**

Convert Code 39 to Full ASCII

By default, any characters that do not have a corresponding character in the Code 39 symbology set are replaced by a space. If this parameter is enabled, the data sent to the wand Interface is encoded in Code 39 Full ASCII. This setting requires that the Host be able to interpret Code 39 Full ASCII data.

This setting applies only if **Convert to Code 39** is also enabled.

***Disable Code 39 Full ASCII Conversion**

Enable Code 39 Full ASCII Conversion

11

Scanner Emulation Interface

Introduction

This chapter describes how to set up the digital scanner with a Scanner Emulation host. Use this mode when Scanner Emulation communication is needed. In this mode, the digital scanner connects to an external decoder or to a decoder integrated in a mobile computer or Point-of-Sale (POS) terminal.

Throughout the programming bar code menus, default values are indicated with asterisks (*).

* Indicates Default — ***Parameter Process and Pass-Through** — Feature/Option

Note: Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where the bar code can be seen clearly, and bars and/or spaces are not merging.

Connecting Using Scanner Emulation

To perform Scanner Emulation, connect the digital scanner to a mobile computer, or a controller which collects the data and interprets it for the host.

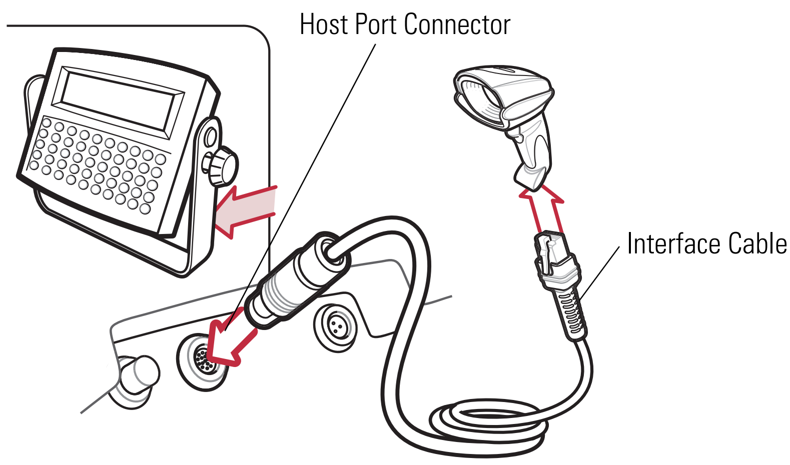


Figure 11-1. Scanner Emulation Connection

Note: Interface cables vary depending on configuration. The connectors illustrated in Figure 11-1 are examples only. The connectors may be different than those illustrated, but the steps to connect the scanner remain the same.

1. Attach the modular connector of the Scanner Emulation interface cable to the cable interface port on the digital scanner (see *Installing the Interface Cable on page 1-4*).
2. Connect the other end of the Scanner Emulation interface cable to the scanner port on the mobile computer or controller.

3. Scan the Scanner Emulation Host bar code from *Scanner Emulation Host on page 11-5* to enable the Scanner Emulation host interface.
4. To modify any other parameter options, scan the appropriate bar codes in this chapter.

WARNING

Connect the digital scanner to 5 volt decoders only. Connecting the digital scanner to a 12 volt decoder can damage the digital scanner and invalidate the warranty.

Scanner Emulation Parameter Defaults

Table 11-1 lists the defaults for the Scanner Emulation host. To change any option, scan the appropriate bar code(s) provided in the Scanner Emulation Host Parameters section beginning on page 11-5.

Note

See *Appendix A, Standard Default Parameters* for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 11-1. Scanner Emulation Default Table

Parameter	Default	Page Number
Beep Style	Beep on Successful Transmit	11-5
Parameter Pass-Through	Parameter Process and Pass Through	11-6
Convert Newer Code Types	Convert Newer Code Types	11-7
Module Width	20 μs	11-8
Convert All Bar Codes to Code 39	Do Not Convert to Bar Codes to Code 39	11-8
Code 39 Full ASCII Conversion	Disable	11-9
Transmission Timeout	3 seconds	11-9
Ignore Unknown Characters	Ignore Unknown Characters	11-10
Leading Margin	2 ms	11-11
Check for Decode LED	Check for Decode LED	11-12

Scanner Emulation Host

Scan the bar code below to enable the Scanner Emulation host.

Scanner Emulation Host

Scanner Emulation Host Parameters

Beep Style

The Scanner Emulation host supports three beep styles.

- **Beep On Successful Transmit**: The digital scanner beeps when the attached decoder issues the decode signal to the digital scanner, so the digital scanner and the attached decoder beep at the same time.
- **Beep At Decode Time**: The digital scanner beeps upon decode. This results in a double beep sequence from most decoders, since the digital scanner beeps, and the decoder beeps (at a different frequency) when it successfully decodes the output.
- **Do Not Beep**: Only the attached decoder issues the decode beep.

In all cases, if an error occurs, the digital scanner issues error beeps.

***Beep On Successful Transmit**

Beep At Decode Time

Do Not Beep

Parameter Pass-Through

The Scanner Emulation host can process parameter bar code messages and send them to the attached decoder. In this way, customers using Symbol compliant decoders can control the behavior of the entire system by scanning the necessary parameters only once.

For example, to enable D 2 of 5, scan the **D 2 of 5 Enable** parameter bar code. The digital scanner and the attached decoder both process the parameter.

***Parameter Process and Pass-Through**

Parameter Process Only

Convert Newer Code Types

The digital scanner supports a variety of code types that are not decodable by attached decoder systems. To allow compatibility in these environments, the digital scanner converts these code types to more commonly decodable symbologies, as per the following chart. Symbologies not listed on this chart are transmitted normally.

Scan this code type:	**Transmitted as:**
Code 11	Code 39
RSS (14, Limited, and Expanded), Coupon Code, PDF, MicroPDF, MaxiCode, DataMatrix, QR Code, Postal Codes, Composite Codes	Code 128

When decoding these code types with this parameter disabled, the digital scanner issues Convert Error beeps and transmits no data.

***Convert Newer Code Types**

Reject Newer Code Types

Module Width

The standard module width is 20 µs. For an extremely slow decoder system, select **50 µs Module Width**.

***20 µs Module Width**

50 µs Module Width

Convert All Bar Codes to Code 39

Scan a bar code below to enable or disable the conversion of all bar code data to Code 39.

***Do Not Convert Bar Codes To Code 39**

Convert All To Code 39

Code 39 Full ASCII Conversion

By default, any characters that do not have a corresponding character in the Code 39 symbology set are replaced by a space. If this parameter is enabled, the data sent to the Scanner Emulation host is encoded in Code 39 Full ASCII. The host must be able to interpret Code 39 Full ASCII data.

This setting applies only if **Convert to Code 39** is also enabled.

***Disable Convert Code 39 To Full ASCII**

Enable Convert Code 39 To Full ASCII

Transmission Timeout

The Scanner Emulation host transmits bar code data to the attached decoder and waits for the decoder to assert the Decode signal, indicating successful transmission. If, after a specified amount of time, the Decode signal is not asserted (indicating that the attached decoder has not successfully received the bar code data), the digital scanner issues transmit error beeps.

Scan the appropriate bar code below to select the desired transmission timeout.

***3 Second Transmission Timeout**

4 Second Transmission Timeout

5 Second Transmission Timeout

Transmission Timeout (continued)

10 Second Transmission Timeout

30 Second Transmission Timeout

Ignore Unknown Characters

Unknown characters are characters the decoder does not recognize. When **Ignore Unknown Characters** is selected, all bar code data is sent except for unknown characters, and no error beeps sound. When **Convert Error on Unknown Characters** is selected, bar codes containing at least one unknown character are not sent to the decoder, and a convert error beep sounds.

***Ignore Unknown Characters**

Convert Error On Unknown Characters

Leading Margin

Scan a bar code below to select a leading margin duration.

1 ms Leading Margin

***2 ms Leading Margin**

3 ms Leading Margin

5 ms Leading Margin

10 ms Leading Margin

Check For Decode LED

The attached decoder normally asserts the Decode line to signal to the Scanner Emulation host that it successfully decoded the transmitted bar code. Some decoders, however, do not assert the Decode signal. In this case, the digital scanner emits transmit error beeps to indicate that the bar code was not successfully transmitted. Scan the **Ignore Decode LED** bar code to disable the Transmit Error beeps.

***Check For Decode LED**

Ignore Decode LED

12

123 Scan

Introduction

123Scan is a Windows®-based utility that programs the digital scanner with all parameters including Advanced Data Formatting (ADF) Rules. An ADF rule modifies bar code data before it is sent to the host to ensure compatibility between bar coded data and the host application. Digital scanners can be programmed via PC download or by scanning a sheet of bar codes generated by the utility. Digital scanner programming is saved in a file for electronic distribution. The 123Scan program includes a help file.

Communication with 123Scan

To communicate with the 123Scan program which runs on a host computer running a Windows operating system, use an RS-232 cable to connect the digital scanner to the host computer (see *Connecting an RS-232 Interface on page 7-4*).

123Scan requirements:

- Host computer with Windows 98, Windows NT, Windows 2000, or Windows XP
- Digital scanner
- RS-232 cable.

123Scan Parameter

To communicate with the 123Scan program, load 123Scan, included in the documentation CD-ROM, onto the host computer, and scan the bar code below. Refer to 123Scan instructions for programming the digital scanner.

Scan the bar code below to enable the 123Scan interface on the digital scanner.

123Scan Configuration

13
Symbologies

Introduction

This chapter describes symbology features and provides the programming bar codes for selecting these features. Before programming, follow the instructions in *Chapter 1, Getting Started*.

The digital scanner is shipped with the settings shown in the *Symbology Default Table on page 13-6* (also see *Appendix A, Standard Default Parameters* for all host device and miscellaneous defaults). If the default values suit requirements, programming is not necessary.

To set feature values, scan a single bar code or a short bar code sequence. The settings are stored in non-volatile memory and are preserved even when the digital scanner is powered down.

Note

Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where the bar code can be seen clearly, and bars and/or spaces are not merging.

If not using a Synapse or USB cable, select a host type (see each host chapter for specific host information) after the power-up beeps sound. This is only necessary upon the first power-up when connected to a new host.

To return all features to default values, scan the **Set All Defaults* bar code on page 4-5. Throughout the programming bar code menus, default values are indicated with asterisks (*****).

* Indicates Default — ***Enable UPC-A** — Feature/Option

Scanning Sequence Examples

In most cases, scanning one bar code sets the parameter value. For example, to transmit bar code data without the UPC-A check digit, simply scan the **Do Not Transmit UPC-A Check Digit** bar code under *Transmit UPC-A Check Digit on page 13-15*. The digital scanner issues a fast warble beep and the LED turns green, signifying a successful parameter entry.

Other parameters, such as **Set Length(s) for D 2 of 5** require scanning several bar codes. See the individual parameter, such as **Set Length(s) for D 2 of 5**, for this procedure.

Errors While Scanning

Unless otherwise specified, to correct an error during a scanning sequence, just re-scan the correct parameter.

Symbology Parameter Defaults

Table 13-1 lists the defaults for all symbologies parameters. To change any option, scan the appropriate bar code(s) provided in the Symbologies Parameters section beginning on 13-10.

Note

See *Appendix A, Standard Default Parameters* for all user preferences, hosts, and miscellaneous default parameters.

Table 13-1. Symbology Default Table

Parameter	Parameter Number	Default	Page Number
UPC/EAN			
UPC-A	01h	Enable	13-10
UPC-E	02h	Enable	13-10
UPC-E1	0Ch	Disable	13-11
EAN-8/JAN 8	04h	Enable	13-11
EAN-13/JAN 13	03h	Enable	13-12
Bookland EAN	53h	Disable	13-12
Decode UPC/EAN/JAN Supplementals (2 and 5 digits)	10h	Ignore	13-13
UPC/EAN/JAN Supplemental Redundancy	50h	10	13-14
Transmit UPC-A Check Digit	28h	Enable	13-15
Transmit UPC-E Check Digit	29h	Enable	13-15
Transmit UPC-E1 Check Digit	2Ah	Enable	13-16
UPC-A Preamble	22h	System Character	13-16
UPC-E Preamble	23h	System Character	13-16
UPC-E1 Preamble	24h	System Character	13-18
Convert UPC-E to A	25h	Disable	13-19
Convert UPC-E1 to A	26h	Disable	13-19
EAN-8/JAN-8 Extend	27h	Disable	13-19
UCC Coupon Extended Code	55h	Disable	13-20
Code 128			
Code 128	08h	Enable	13-20
UCC/EAN-128	0Eh	Enable	13-21
ISBT 128	54h	Enable	13-21

Table 13-1. Symbology Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
Code 39			
Code 39	00h	Enable	13-22
Trioptic Code 39	0Dh	Disable	13-22
Convert Code 39 to Code 32 (Italian Pharmacy Code)	56h	Disable	13-23
Code 32 Prefix	E7h	Disable	13-23
Set Length(s) for Code 39	12h 13h	2 to 55	13-24
Code 39 Check Digit Verification	30h	Disable	13-25
Transmit Code 39 Check Digit	2Bh	Disable	13-26
Code 39 Full ASCII Conversion	11h	Disable	13-26
Buffer Code 39	71h	Disable	13-27
Code 93			
Code 93	09h	Disable	13-29
Set Length(s) for Code 93	1Ah 1Bh	4 to 55	13-30
Code 11			
Code 11	0Ah	Disable	13-31
Set Lengths for Code 11	1Ch 1Dh	4 to 55	13-32
Code 11 Check Digit Verification	34h	Disable	13-33
Transmit Code 11 Check Digit(s)	2Fh	Disable	13-34
Interleaved 2 of 5 (ITF)			
Interleaved 2 of 5 (ITF)	06h	Enable	13-34
Set Lengths for I 2 of 5	16h 17h	14	13-35
I 2 of 5 Check Digit Verification	31h	Disable	13-36
Transmit I 2 of 5 Check Digit	2Ch	Disable	13-37
Convert I 2 of 5 to EAN 13	52h	Disable	13-37
Discrete 2 of 5 (DTF)			
Discrete 2 of 5	05h	Disable	13-38
Set Length(s) for D 2 of 5	14h 15h	12	13-38

Table 13-1. Symbology Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
Codabar (NW - 7)			
Codabar	07h	Disable	13-39
Set Lengths for Codabar	18h 19h	5 to 55	13-40
CLSI Editing	36h	Disable	13-41
NOTIS Editing	37h	Disable	13-41
MSI			
MSI	0Bh	Disable	13-42
Set Length(s) for MSI	1Eh 1Fh	1 to 55	13-42
MSI Check Digits	32h	One	13-43
Transmit MSI Check Digit	2Eh	Disable	13-44
MSI Check Digit Algorithm	33h	Mod 10/Mod 10	13-44
Postal Codes			
US Postnet	59h	Enable	13-45
US Planet	5Ah	Enable	13-45
UK Postal	5Bh	Enable	13-46
Transmit UK Postal Check Digit	60h	Enable	13-46
Japan Postal	F0h 22h	Enable	13-47
Australian Postal	F0h 23h	Enable	13-47
Dutch Postal	F0h 46h	Enable	13-48
Transmit US Postal Check Digit	5Fh	Enable	13-48
RSS (Reduced Space Symbology)			
RSS 14	F0h 52h	Enable	13-49
RSS Limited	F0h 53h	Enable	13-49
RSS Expanded	F0h 54h	Enable	13-50
Convert RSS to UPC/EAN	F0h 8Dh	Disable	13-50
Composite			
Composite CC-C	F0h 55h	Disable	13-51
Composite CC-A/B	F0h 56h	Disable	13-51

Table 13-1. Symbology Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
Composite TLC-39	F0h 73h	Disable	13-52
UPC Composite Mode	F0h 58h	Always Linked	13-53
Composite Beep Mode	F0h 8Eh	Beep As Each Code Type is Decoded	13-54
UCC/EAN Code 128 Emulation Mode for UCC/EAN Composite Codes	F0h ABh	Disable	13-54
2D Symbologies			
PDF417	0Fh	Enable	13-55
MicroPDF417	E3h	Disable	13-55
Code 128 Emulation	7Bh	Disable	13-56
Data Matrix	F0h 24h	Enable	13-57
Maxicode	F0h 26h	Enable	13-57
QR Code	F0h 25h	Enable	13-58
Symbology-Specific Security Levels			
Redundancy Level	4Eh	1	13-59
Security Level	4Dh	0	13-61
Intercharacter Gap Size	F0h 7Dh	Normal	13-62
Report Version			13-62
Macro PDF			
Flush Macro PDF Buffer			13-63
Abort Macro PDF Entry			13-63

UPC/EAN

Enable/Disable UPC-A

Parameter # 01h

To enable or disable UPC-A, scan the appropriate bar code below.

***Enable UPC-A**
(01h)

Disable UPC-A
(00h)

Enable/Disable UPC-E

Parameter # 02h

To enable or disable UPC-E, scan the appropriate bar code below.

***Enable UPC-E**
(01h)

Disable UPC-E
(00h)

Enable/Disable UPC-E1

Parameter # 0Ch

UPC-E1 is disabled by default.

To enable or disable UPC-E1, scan the appropriate bar code below.

Note UPC-E1 is not a UCC (Uniform Code Council) approved symbology.

Enable UPC-E1
(01h)

***Disable UPC-E1**
(00h)

Enable/Disable EAN-8/JAN-8

Parameter # 04h

To enable or disable EAN-8/JAN-8, scan the appropriate bar code below.

***Enable EAN-8/JAN-8**
(01h)

Disable EAN-8/JAN-8
(00h)

Enable/Disable EAN-13/JAN-13

Parameter # 03h

To enable or disable EAN-13/JAN-13, scan the appropriate bar code below.

***Enable EAN-13/JAN-13**
(01h)

Disable EAN-13/JAN-13
(00h)

Enable/Disable Bookland EAN

Parameter # 53h

To enable or disable Bookland EAN, scan the appropriate bar code below.

Enable Bookland EAN
(01h)

***Disable Bookland EAN**
(00h)

Decode UPC/EAN/JAN Supplementals

Parameter # 10h

Supplementals are bar codes appended according to specific format conventions (e.g., UPC A+2, UPC E+2, EAN 13+2). Six options are available.

- If **Decode UPC/EAN/JAN Only With Supplementals** is selected, UPC/EAN/JAN symbols without supplementals are not decoded.
- If **Ignore Supplementals** is selected, and the digital scanner is presented with a UPC/EAN/JAN with a supplemental, the UPC/EAN/JAN is decoded and the supplemental bar code is ignored.
- An **Autodiscriminate Option** is also available. If this option is selected, choose an appropriate *UPC/EAN/JAN Supplemental Redundancy* value from the next page. A value of 5 or more is recommended.
- **Enable 378/379 Supplemental Mode** to delay only EAN-13/JAN-13 bar codes starting with a '378' or '379' prefix by the supplemental search process. All other UPC/EAN/JAN bar codes are exempt from the search and are reported instantly upon decode.
- Select **Enable 978 Supplemental Mode** to delay only EAN-13/JAN-13 bar codes starting with a '978' prefix by the supplemental search process. All other UPC/EAN/JAN bar codes are exempt from the search and are reported instantly upon decode.
- Select **Enable Smart Supplemental Mode** to delay only EAN-13/JAN-13 bar codes starting with a '378', '379', or '978' prefix by the supplemental search process. All other UPC/EAN/JAN bar codes are exempt from the search and are reported instantly upon decode.

Note: To minimize the risk of invalid data transmission, select either to decode or ignore supplemental characters.

Decode UPC/EAN/JAN Only With Supplementals
(01h)

***Ignore Supplementals**
(00h)

Autodiscriminate UPC/EAN/JAN Supplementals
(02h)

Decode UPC/EAN/JAN Supplementals (continued)

Enable 378/379 Supplemental Mode
(04h)

Enable 978 Supplemental Mode
(05h)

Enable Smart Supplemental Mode
(03h)

UPC/EAN/JAN Supplemental Redundancy

Parameter # 50h

With **Autodiscriminate UPC/EAN/JAN Supplementals** selected, this option adjusts the number of times a symbol without supplementals is decoded before transmission. The range is from two to thirty times. Five or above is recommended when decoding a mix of UPC/EAN/JAN symbols with and without supplementals, and the autodiscriminate option is selected. The default is set at 10.

Scan the bar code below to set a decode redundancy value. Next, scan two numeric bar codes in *Appendix D, Numeric Bar Codes*. Single digit numbers must have a leading zero. To correct an error or change a selection, scan **Cancel** on page D-4.

UPC/EAN/JAN Supplemental Redundancy

Transmit UPC-A Check Digit

Parameter # 28h

The check digit is the last character of the symbol used to verify the integrity of the data. Scan the appropriate bar code below to transmit the bar code data with or without the UPC-A check digit. It is always verified to guarantee the integrity of the data.

***Transmit UPC-A Check Digit**
(01h)

Do Not Transmit UPC-A Check Digit
(00h)

Transmit UPC-E Check Digit

Parameter # 29h

The check digit is the last character of the symbol used to verify the integrity of the data. Scan the appropriate bar code below to transmit the bar code data with or without the UPC-E check digit. It is always verified to guarantee the integrity of the data.

***Transmit UPC-E Check Digit**
(01h)

Do Not Transmit UPC-E Check Digit
(00h)

Transmit UPC-E1 Check Digit

Parameter # 2Ah

The check digit is the last character of the symbol used to verify the integrity of the data. Scan the appropriate bar code below to transmit the bar code data with or without the UPC-E1 check digit. It is always verified to guarantee the integrity of the data.

***Transmit UPC-E1 Check Digit**
(01h)

Do Not Transmit UPC-E1 Check Digit
(00h)

UPC-A Preamble

Parameter # 22h

Preamble characters are part of the UPC symbol, and include Country Code and System Character. There are three options for transmitting a UPC-A preamble to the host device: transmit System Character only, transmit System Character and Country Code ("0" for USA), and transmit no preamble. Select the appropriate option to match the host system.

No Preamble (<DATA>)
(00h)

***System Character (<SYSTEM CHARACTER> <DATA>)**
(01h)

System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)
(02h)

UPC-E Preamble

Parameter # 23h

Preamble characters are part of the UPC symbol, and include Country Code and System Character. There are three options for transmitting a UPC-E preamble to the host device: transmit System Character only, transmit System Character and Country Code ("0" for USA), and transmit no preamble. Select the appropriate option to match the host system.

No Preamble (<DATA>)
(00h)

***System Character (<SYSTEM CHARACTER> <DATA>)**
(01h)

System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)
(02h)

UPC-E1 Preamble

Parameter # 24h

Preamble characters are part of the UPC symbol, and include Country Code and System Character. There are three options for transmitting a UPC-E1 preamble to the host device: transmit System Character only, transmit System Character and Country Code ("0" for USA), and transmit no preamble. Select the appropriate option to match the host system.

No Preamble (<DATA>)
(00h)

***System Character (<SYSTEM CHARACTER> <DATA>)**
(01h)

System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)
(02h)

Convert UPC-E to UPC-A

Parameter # 25h

Enable this to convert UPC-E (zero suppressed) decoded data to UPC-A format before transmission. After conversion, the data follows UPC-A format and is affected by UPC-A programming selections (e.g., Preamble, Check Digit).

When disabled, UPC-E decoded data is transmitted as UPC-E data, without conversion.

Convert UPC-E to UPC-A (Enable)
(01h)

***Do Not Convert UPC-E to UPC-A (Disable)**
(00h)

Convert UPC-E1 to UPC-A

Parameter # 26h

Enable this to convert UPC-E1 decoded data to UPC-A format before transmission. After conversion, the data follows UPC-A format and is affected by UPC-A programming selections (e.g., Preamble, Check Digit).

When disabled, UPC-E1 decoded data is transmitted as UPC-E1 data, without conversion.

Convert UPC-E1 to UPC-A (Enable)
(01h)

***Do Not Convert UPC-E1 to UPC-A (Disable)**
(00h)

EAN-8/JAN-8 Extend

Parameter # 27h

When enabled, this parameter adds five leading zeros to decoded EAN-8 symbols to make them compatible in format to EAN-13 symbols.

When disabled, EAN-8 symbols are transmitted as is.

Enable EAN/JAN Zero Extend
(01h)

***Disable EAN/JAN Zero Extend**
(00h)

UCC Coupon Extended Code

Parameter # 55h

When enabled, this parameter decodes UPC-A bar codes starting with digit ‘5’, EAN-13 bar codes starting with digit ‘99’, and UPC-A/EAN-128 Coupon Codes. UPCA, EAN-13, and EAN-128 must be enabled to scan all types of Coupon Codes.

Enable UCC Coupon Extended Code
(01h)

***Disable UCC Coupon Extended Code**
(00h)

Note: Use the *Decode UPC/EAN Supplemental Redundancy* parameter to control autodiscrimination of the EAN128 (right half) of a coupon code.

Code 128

Enable/Disable Code 128

Parameter # 08h

To enable or disable Code 128, scan the appropriate bar code below.

***Enable Code 128**
(01h)

Disable Code 128
(00h)

Enable/Disable UCC/EAN-128

Parameter # 0Eh

To enable or disable UCC/EAN-128, scan the appropriate bar code below.

***Enable UCC/EAN-128**
(01h)

Disable UCC/EAN-128
(00h)

Enable/Disable ISBT 128

Parameter # 54h

ISBT 128 is a variant of Code 128 used in the blood bank industry. Scan a bar code below to enable or disable ISBT 128. If necessary, the host must perform concatenation of the ISBT data.

***Enable ISBT 128**
(01h)

Disable ISBT 128
(00h)

Code 39

Enable/Disable Code 39

Parameter # 00h

To enable or disable Code 39, scan the appropriate bar code below.

***Enable Code 39**
(01h)

Disable Code 39
(00h)

Enable/Disable Trioptic Code 39

Parameter # 0Dh

Trioptic Code 39 is a variant of Code 39 used in the marking of computer tape cartridges. Trioptic Code 39 symbols always contain six characters. To enable or disable Trioptic Code 39, scan the appropriate bar code below.

Enable Trioptic Code 39
(01h)

***Disable Trioptic Code 39**
(00h)

Note

Trioptic Code 39 and Code 39 Full ASCII cannot be enabled simultaneously.

Convert Code 39 to Code 32

Parameter # 56h

Code 32 is a variant of Code 39 used by the Italian pharmaceutical industry. Scan the appropriate bar code below to enable or disable converting Code 39 to Code 32.

Note

Code 39 must be enabled for this parameter to function.

Enable Convert Code 39 to Code 32
(01h)

***Disable Convert Code 39 to Code 32**
(00h)

Code 32 Prefix

Parameter # E7h

Scan the appropriate bar code below to enable or disable adding the prefix character “A” to all Code 32 bar codes.

Note

Convert Code 39 to Code 32 must be enabled for this parameter to function.

Enable Code 32 Prefix
(01h)

***Disable Code 32 Prefix**
(00h)

Set Lengths for Code 39

Parameter # L1 = 12h, L2 = 13h

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for Code 39 to any length, one or two discrete lengths, or lengths within a specific range. If Code 39 Full ASCII is enabled, **Length Within a Range** or **Any Length** are the preferred options.

Note

When setting lengths for different bar code types by scanning single digit numbers, single digit numbers must always be preceded by a leading zero.

- **One Discrete Length** - Select this option to decode only Code 39 symbols containing a selected length. Select the length using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only Code 39 symbols with 14 characters, scan **Code 39 - One Discrete Length**, then scan **1** followed by **4**. To correct an error or change the selection, scan **Cancel** on page D-4.
- **Two Discrete Lengths** - Select this option to decode only Code 39 symbols containing either of two selected lengths. Select lengths using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only those Code 39 symbols containing either 2 or 14 characters, select **Code 39 - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. To correct an error or change the selection, scan **Cancel** on page D-4.
- **Length Within Range** - Select this option to decode a Code 39 symbol with a specific length range. Select lengths using numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode Code 39 symbols containing between 4 and 12 characters, first scan **Code 39 - Length Within Range**. Then scan **0**, **4**, **1,** and **2** (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan **Cancel** on page D-4.
- **Any Length** - Select this option to decode Code 39 symbols containing any number of characters within the digital scanner capability.

Code 39 - One Discrete Length

Code 39 - Two Discrete Lengths

Set Lengths for Code 39 (continued)

Code 39 - Length Within Range

Code 39 - Any Length

Code 39 Check Digit Verification

Parameter # 30h

When this feature is enabled, the digital scanner checks the integrity of all Code 39 symbols to verify that the data complies with specified check digit algorithm. Only Code 39 symbols which include a modulo 43 check digit are decoded. Enable this feature if the Code 39 symbols contain a Modulo 43 check digit.

Enable Code 39 Check Digit
(01h)

***Disable Code 39 Check Digit**
(00h)

Transmit Code 39 Check Digit

Parameter # 2Bh

Scan a bar code below to transmit Code 39 data with or without the check digit.

Transmit Code 39 Check Digit (Enable)
(01h)

***Do Not Transmit Code 39 Check Digit (Disable)**
(00h)

Note: Code 39 Check Digit Verification must be enabled for this parameter to function.

Code 39 Full ASCII Conversion

Parameter # 11h

Code 39 Full ASCII is a variant of Code 39 which pairs characters to encode the full ASCII character set. To enable or disable Code 39 Full ASCII, scan the appropriate bar code below.

Enable Code 39 Full ASCII
(01h)

***Disable Code 39 Full ASCII**
(00h)

Note: Trioptic Code 39 and Code 39 Full ASCII cannot be enabled simultaneously.

Code 39 Full ASCII to Full ASCII Correlation is host-dependent, and is therefore described in the ASCII Character Set Table for the appropriate interface. See the *ASCII Character Set for Keyboard Wedge on page 6-15*, the *ASCII Character Set for USB on page 8-12*, or the *ASCII Character Set for RS-232 on page 7-21*.

Code 39 Buffering (Scan & Store)

Parameter # 71h

This feature allows the digital scanner to accumulate data from multiple Code 39 symbols.

Selecting the Scan and Store option (Buffer Code 39) temporarily buffers all Code 39 symbols having a leading space as a first character for later transmission. The leading space is not buffered.

Decode of a valid Code 39 symbol with no leading space causes transmission in sequence of all buffered data in a first-in first-out format, plus transmission of the "triggering" symbol. See the following pages for further details.

When the **Do Not Buffer Code 39** option is selected, all decoded Code 39 symbols are transmitted immediately without being stored in the buffer.

This feature affects Code 39 only. If selecting **Buffer Code 39**, we recommend configuring the digital scanner to decode Code 39 symbology only.

Buffer Code 39 (Enable)
(01h)

***Do Not Buffer Code 39 (Disable)**
(00h)

While there is data in the transmission buffer, selecting **Do Not Buffer Code 39** is not allowed. The buffer holds 200 bytes of information.

To disable Code 39 buffering when there is data in the transmission buffer, first force the buffer transmission (see *Transmit Buffer on page 13-28*) or clear the buffer.

Buffer Data

To buffer data, Code 39 buffering must be enabled and a Code 39 symbol must be read with a space immediately following the start pattern.

- Unless the data overflows the transmission buffer, the digital scanner issues a lo/hi beep to indicate successful decode and buffering. (For overflow conditions, see *Overfilling Transmission Buffer*.)
- The digital scanner adds the decoded data excluding the leading space to the transmission buffer.
- No transmission occurs.

Clear Transmission Buffer

To clear the transmission buffer, scan the **Clear Buffer** bar code below, which contains only a start character, a dash (minus), and a stop character.

- The digital scanner issues a short hi/lo/hi beep.
- The digital scanner erases the transmission buffer.
- No transmission occurs.

Clear Buffer

Note: The Clear Buffer contains only the dash (minus) character. In order to scan this command, be sure Code 39 length is set to include length 1.

Transmit Buffer

There are two methods to transmit the Code 39 buffer.

1. Scan the **Transmit Buffer** bar code below. Only a start character, a plus (+), and a stop character.
   - The digital scanner transmits and clears the buffer.
- The digital scanner issues a Lo/Hi beep.

Transmit Buffer

2. Scan a Code 39 bar code with a leading character other than a space.
   - The digital scanner appends new decode data to buffered data.
   - The digital scanner transmits and clears the buffer.
   - The digital scanner signals that the buffer was transmitted with a lo/hi beep.
   - Digital Scanner transmits and clears the buffer.

Note: The Transmit Buffer contains only a plus (+) character. In order to scan this command, be sure Code 39 length is set to include length 1.

Overfilling Transmission Buffer

The Code 39 buffer holds 200 characters. If the symbol just read results in an overflow of the transmission buffer:

- The digital scanner indicates that the symbol was rejected by issuing three long, high beeps.
- No transmission occurs. The data in the buffer is not affected.

Attempt to Transmit an Empty Buffer

If the symbol just read was the **Transmit Buffer** symbol and the Code 39 buffer is empty:

- A short lo/hi/lo beep signals that the buffer is empty.
- No transmission occurs.
- The buffer remains empty.

Code 93

Enable/Disable Code 93

Parameter # 09h

To enable or disable Code 93, scan the appropriate bar code below.

Enable Code 93
(01h)

***Disable Code 93**
(00h)

Set Lengths for Code 93

Parameter # L1 = 1Ah, L2 = 1Bh

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for Code 93 to any length, one or two discrete lengths, or lengths within a specific range.

- **One Discrete Length** - Select this option to decode only Code 93 symbols containing a selected length. Select the length using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only Code 93 symbols with 14 characters, scan **Code 93 - One Discrete Length**, then scan **1** followed by **4**. To correct an error or to change the selection, scan **Cancel** on page D-4.
- **Two Discrete Lengths** - Select this option to decode only Code 93 symbols containing either of two selected lengths. Select lengths using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only those Code 93 symbols containing either 2 or 14 characters, select **Code 93 - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. To correct an error or to change the selection, scan **Cancel** on page D-4.
- **Length Within Range** - Select this option to decode a Code 93 symbol with a specific length range. Select lengths using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode Code 93 symbols containing between 4 and 12 characters, first scan **Code 93 - Length Within Range**. Then scan **0**, **4**, **1,** and **2** (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan **Cancel** on page D-4.
- **Any Length** - Scan this option to decode Code 93 symbols containing any number of characters within the digital scanner's capability.

Set Lengths for Code 93 (continued)

Code 93 - One Discrete Length

Code 93 - Two Discrete Lengths

Code 93 - Length Within Range

Code 93 - Any Length

Code 11

Code 11

Parameter # 0Ah

To enable or disable Code 11, scan the appropriate bar code below.

Enable Code 11
(01h)

***Disable Code 11**
(00h)

Set Lengths for Code 11

Parameter # L1 = 1Ch, L2 = 1Dh

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for Code 11 to any length, one or two discrete lengths, or lengths within a specific range.

- **One Discrete Length** - Select this option to decode only Code 11 symbols containing a selected length. Select the length using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only Code 11 symbols with 14 characters, scan **Code 11 - One Discrete Length**, then scan **1** followed by **4**. To correct an error or to change the selection, scan **Cancel** on page D-4.
- **Two Discrete Lengths** - Select this option to decode only Code 11 symbols containing either of two selected lengths. Select lengths using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only those Code 11 symbols containing either 2 or 14 characters, select **Code 11 - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. To correct an error or to change the selection, scan **Cancel** on page D-4.
- **Length Within Range** - Select this option to decode a Code 11 symbol with a specific length range. Select lengths using numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode Code 11 symbols containing between 4 and 12 characters, first scan **Code 11 - Length Within Range**. Then scan **0**, **4**, **1,** and **2** (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan **Cancel** on page D-4.
- **Any Length** - Scan this option to decode Code 11 symbols containing any number of characters within the digital scanner capability.

Code 11 - One Discrete Length

Code 11 - Two Discrete Lengths

Code 11 - Length Within Range

Code 11 - Any Length

Code 11 Check Digit Verification

Parameter # 34h

This feature allows the digital scanner to check the integrity of all Code 11 symbols to verify that the data complies with the specified check digit algorithm. This selects the check digit mechanism for the decoded Code 11 bar code. The options are to check for one check digit, check for two check digits, or disable the feature.

To enable this feature, scan the bar code below corresponding to the number of check digits encoded in the Code 11 symbols.

***Disable**
(00h)

One Check Digit
(01h)

Two Check Digits
(02h)

Transmit Code 11 Check Digits

Parameter # 2Fh

This feature selects whether or not to transmit the Code 11 check digit(s).

Transmit Code 11 Check Digit(s) (Enable)
(01h)

***Do Not Transmit Code 11 Check Digit(s) (Disable)**
(00h)

Note: Code 11 Check Digit Verification must be enabled for this parameter to function.

Interleaved 2 of 5 (ITF)

Enable/Disable Interleaved 2 of 5

Parameter # 06h

To enable or disable Interleaved 2 of 5, scan the appropriate bar code below, and select an Interleaved 2 of 5 length from the following pages.

***Enable Interleaved 2 of 5**
(01h)

Disable Interleaved 2 of 5
(00h)

Set Lengths for Interleaved 2 of 5

Parameter # L1 = 16h, L2 = 17h

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for I 2 of 5 to any length, one or two discrete lengths, or lengths within a specific range.

- **One Discrete Length** - Select this option to decode only I 2 of 5 symbols containing a selected length. Select the length using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only I 2 of 5 symbols with 14 characters, scan **I 2 of 5 - One Discrete Length**, then scan **1** followed by **4**. To correct an error or to change the selection, scan **Cancel** on page D-4.
- **Two Discrete Lengths** - Select this option to decode only I 2 of 5 symbols containing either of two selected lengths. Select lengths using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only those I 2 of 5 symbols containing either 2 or 14 characters, select **I 2 of 5 - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. To correct an error or to change the selection, scan **Cancel** on page D-4.
- **Length Within Range** - Select this option to decode an I 2 of 5 symbol with a specific length range. Select lengths using numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode I 2 of 5 symbols containing between 4 and 12 characters, first scan **I 2 of 5 - Length Within Range**. Then scan **0**, **4**, **1,** and **2** (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan **Cancel** on page D-4.
- **Any Length** - Scan this option to decode I 2 of 5 symbols containing any number of characters within the digital scanner capability.

Note

Due to the construction of the I 2 of 5 symbology, it is possible for a scan line covering only a portion of the code to be interpreted as a complete scan, yielding less data than is encoded in the bar code. To prevent this, select specific lengths (**I 2 of 5 - One Discrete Length - Two Discrete Lengths**) for I 2 of 5 applications.

I 2 of 5 - One Discrete Length

I 2 of 5 - Two Discrete Lengths

Set Lengths for Interleaved 2 of 5 (continued)

I 2 of 5 - Length Within Range

I 2 of 5 - Any Length

I 2 of 5 Check Digit Verification

Parameter # 31h

When this feature is enabled, the digital scanner checks the integrity of all I 2 of 5 symbols to verify the data complies with either the specified Uniform Symbology Specification (USS), or the Optical Product Code Council (OPCC) check digit algorithm.

***Disable**
(00h)

USS Check Digit
(01h)

OPCC Check Digit
(02h)

Transmit I 2 of 5 Check Digit

Parameter # 2Ch

Scan the appropriate bar code below to transmit I 2 of 5 data with or without the check digit.

Transmit I 2 of 5 Check Digit (Enable)
(01h)

***Do Not Transmit I 2 of 5 Check Digit (Disable)**
(00h)

Convert I 2 of 5 to EAN-13

Parameter # 52h

Enable this parameter to convert 14-character I 2 of 5 codes to EAN-13, and transmit to the host as EAN-13. To accomplish this, the I 2 of 5 code must be enabled, and the code must have a leading zero and a valid EAN-13 check digit.

Convert I 2 of 5 to EAN-13 (Enable)
(01h)

***Do Not Convert I 2 of 5 to EAN-13 (Disable)**
(00h)

Discrete 2 of 5 (DTF)

Enable/Disable Discrete 2 of 5

Parameter # 05h

To enable or disable Discrete 2 of 5, scan the appropriate bar code below.

Enable Discrete 2 of 5
(01h)

***Disable Discrete 2 of 5**
(00h)

Set Lengths for Discrete 2 of 5

Parameter # L1 = 14h, L2 = 15h

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for D 2 of 5 to any length, one or two discrete lengths, or lengths within a specific range.

- **One Discrete Length** - Select this option to decode only D 2 of 5 symbols containing a selected length. Select the length using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only D 2 of 5 symbols with 14 characters, scan **D 2 of 5 - One Discrete Length**, then scan **1** followed by **4**. To correct an error or to change the selection, scan **Cancel** on page D-4.
- **Two Discrete Lengths** - Select this option to decode only D 2 of 5 symbols containing either of two selected lengths. Select lengths using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only those D 2 of 5 symbols containing either 2 or 14 characters, select **D 2 of 5 - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. To correct an error or to change the selection, scan **Cancel** on page D-4.
- **Length Within Range** - Select this option to decode a D 2 of 5 symbol with a specific length range. Select lengths using numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode D 2 of 5 symbols containing between 4 and 12 characters, first scan **D 2 of 5 - Length Within Range**. Then scan **0**, **4**, **1,** and **2** (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan **Cancel** on page D-4.
- **Any Length** - Scan this option to decode D 2 of 5 symbols containing any number of characters within the digital scanner capability.

Note

Due to the construction of the D 2 of 5 symbology, it is possible for a scan line covering only a portion of the code to be interpreted as a complete scan, yielding less data than is encoded in the bar code. To prevent this, select specific lengths (**D 2 of 5 - One Discrete Length - Two Discrete Lengths**) for D 2 of 5 applications.

Set Lengths for Discrete 2 of 5 (continued)

D 2 of 5 - One Discrete Length

D 2 of 5 - Two Discrete Lengths

D 2 of 5 - Length Within Range

D 2 of 5 - Any Length

Codabar (NW - 7)

Enable/Disable Codabar

Parameter # 07h

To enable or disable Codabar, scan the appropriate bar code below.

Enable Codabar
(01h)

***Disable Codabar**
(00h)

Set Lengths for Codabar

Parameter # L1 = 18h, L2 = 19h

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for Codabar to any length, one or two discrete lengths, or lengths within a specific range.

- **One Discrete Length** - Select this option to decode only Codabar symbols containing a selected length. Select the length using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only Codabar symbols with 14 characters, scan **Codabar - One Discrete Length**, then scan **1** followed by **4**. To correct an error or to change the selection, scan **Cancel** on page D-4.
- **Two Discrete Lengths** - Select this option to decode only Codabar symbols containing either of two selected lengths. Select lengths using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only Codabar symbols containing either 2 or 14 characters, select **Codabar - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. To correct an error or to change the selection, scan **Cancel** on page D-4.
- **Length Within Range** - Select this option to decode a Codabar symbol with a specific length range. Select lengths using numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode Codabar symbols containing between 4 and 12 characters, first scan **Codabar - Length Within Range**. Then scan **0**, **4**, **1,** and **2** (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan **Cancel** on page D-4.
- **Any Length** - Scan this option to decode Codabar symbols containing any number of characters within the digital scanner capability.

Codabar - One Discrete Length

Codabar - Two Discrete Lengths

Codabar - Length Within Range

Codabar - Any Length

CLSI Editing

Parameter # 36h

When enabled, this parameter strips the start and stop characters and inserts a space after the first, fifth, and tenth characters of a 14-character Codabar symbol. Enable this feature if the host system requires this data format.

Note: Symbol length does not include start and stop characters.

Enable CLSI Editing
(01h)

***Disable CLSI Editing**
(00h)

NOTIS Editing

Parameter # 37h

When enabled, this parameter strips the start and stop characters from a decoded Codabar symbol. Enable this feature if the host system requires this data format.

Enable NOTIS Editing
(01h)

***Disable NOTIS Editing**
(00h)

MSI

Enable/Disable MSI

Parameter # 0Bh

To enable or disable MSI, scan the appropriate bar code below.

Enable MSI
(01h)

***Disable MSI**
(00h)

Set Lengths for MSI

Parameter # L1 = 1Eh, L2 = 1Fh

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for MSI to any length, one or two discrete lengths, or lengths within a specific range.

- **One Discrete Length** - Select this option to decode only MSI symbols containing a selected length. Select the length using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only MSI symbols with 14 characters, scan **MSI - One Discrete Length**, then scan **1** followed by **4**. To correct an error or to change the selection, scan **Cancel** on page D-4.
- **Two Discrete Lengths** - Select this option to decode only MSI symbols containing either of two selected lengths. Select lengths using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only MSI symbols containing either 2 or 14 characters, select **MSI - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. To correct an error or to change the selection, scan **Cancel** on page D-4.
- **Length Within Range** - Select this option to decode a MSI symbol with a specific length range. Select lengths using numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode MSI symbols containing between 4 and 12 characters, first scan **MSI - Length Within Range**. Then scan **0**, **4**, **1,** and **2** (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan **Cancel** on page D-4.
- **Any Length** - Scan this option to decode MSI symbols containing any number of characters within the digital scanner capability.

Note: Due to the construction of the MSI symbology, it is possible for a scan line covering only a portion of the code to be interpreted as a complete scan, yielding less data than is encoded in the bar code. To prevent this, select specific lengths (**MSI - One Discrete Length - Two Discrete Lengths**) for MSI applications.

Set Lengths for MSI (continued)

MSI - One Discrete Length

MSI - Two Discrete Lengths

MSI - Length Within Range

MSI - Any Length

MSI Check Digits

Parameter # 32h

With MSI symbols, one check digit is mandatory and always verified by the reader. The second check digit is optional. If the MSI codes include two check digits, scan the **Two MSI Check Digits** bar code to enable verification of the second check digit.

See *MSI Check Digit Algorithm on page 13-44* for the selection of second digit algorithms.

***One MSI Check Digit**
(00h)

Two MSI Check Digits
(01h)

Transmit MSI Check Digit(s)

Parameter # 2Eh

Scan a bar code below to transmit MSI data with or without the check digit.

Transmit MSI Check Digit(s) (Enable)
(01h

***Do Not Transmit MSI Check Digit(s) (Disable)**
(00h)

MSI Check Digit Algorithm

Parameter # 33h

Two algorithms are possible for the verification of the second MSI check digit. Select the bar code below corresponding to the algorithm used to encode the check digit.

MOD 10/MOD 11
(00h)

***MOD 10/MOD 10**
(01h)

Postal Codes

US Postnet

Parameter # 59h

To enable or disable US Postnet, scan the appropriate bar code below.

***Enable US Postnet**
(01h)

Disable US Postnet
(00h)

US Planet

Parameter # 5Ah

To enable or disable US Planet, scan the appropriate bar code below.

***Enable US Planet**
(01h)

Disable US Planet
(00h)

UK Postal

Parameter # 5Bh

To enable or disable UK Postal, scan the appropriate bar code below.

***Enable UK Postal**
(01h)

Disable UK Postal
(00h)

Transmit UK Postal Check Digit

Parameter # 60h

Select whether to transmit UK Postal data with or without the check digit.

***Transmit UK Postal**
Check Digit
(01h)

Do Not Transmit UK Postal Check Digit
(00h)

Japan Postal

Parameter # F0h, 22h

To enable or disable Japan Postal, scan the appropriate bar code below.

***Enable Japan Postal**
(01h)

Disable Japan Postal
(00h)

Australian Postal

Parameter # F0h, 23h

To enable or disable Australian Postal, scan the appropriate bar code below.

***Enable Australian Postal**
(01h)

Disable Australian Postal
(00h)

Dutch Postal

Parameter # F0h, 46h

To enable or disable Dutch Postal, scan the appropriate bar code below.

***Enable Dutch Postal**
(01h)

Disable Dutch Postal
(00h)

Transmit US Postal Check Digit

Parameter # 5Fh

Select whether to transmit US Postal data with or without the check digit.

***Transmit US Postal Check Digit**
(01h)

Do Not Transmit US Postal Check Digit
(00h)

RSS (Reduced Space Symbology)

The variants of RSS are RSS 14, RSS Expanded, and RSS Limited. The limited and expanded versions have stacked variants. Scan the appropriate bar code below to enable or disable each variant of RSS.

RSS-14
Parameter # F0h 52h.

***Enable RSS 14**
(01h)

Disable RSS 14
(00h)

RSS Limited
Parameter # F0h 53h.

***Enable RSS Limited**
(01h)

Disable RSS Limited
(00h)

RSS Expanded
Parameter # F0h 54h.

***Enable RSS Expanded**
(01h)

Disable RSS Expanded
(00h)

Convert RSS to UPC/EAN

Parameter # F0h, 8Dh

This parameter only applies to RSS-14 and RSS Limited symbols not decoded as part of a Composite symbol. Enable this to strip the leading '010' from RSS-14 and RSS Limited symbols encoding a single zero as the first digit, and report the bar code as EAN-13.

For bar codes beginning with two or more zeros but not six zeros, this parameter strips the leading '0100' and reports the bar code as UPC-A. The UPC-A Preamble parameter that transmits the system character and country code applies to converted bar codes. Note that neither the system character nor the check digit can be stripped.

Enable Convert RSS to UPC/EAN
(01h)

***Disable Convert RSS to UPC/EAN**
(00h)

Composite

Composite CC-C

Parameter # F0h 55h

Scan a bar code below to enable or disable Composite bar codes of type CC-C.

Enable CC-C
(01h)

***Disable CC-C**
(00h)

Composite CC-A/B

Parameter # F0h 56h

Scan a bar code below to enable or disable Composite bar codes of type CC-A/B.

Enable CC-A/B
(01h)

***Disable CC-A/B**
(00h)

Composite TLC-39

Parameter # F0h 73h

Scan a bar code below to enable or disable Composite bar codes of type TLC-39.

Enable TLC39
(01h)

***Disable TLC39**
(00h)

UPC Composite Mode

Parameter # F0h 58h

UPC symbols can be “linked” with a 2D symbol during transmission as if they were one symbol. There are three options for these symbols:

- Select **UPC Never Linked** to transmit UPC bar codes regardless of whether a 2D symbol is detected.
- Select **UPC Always Linked** to transmit UPC bar codes and the 2D portion.
  If 2D is not present, the UPC bar code does not transmit.
- If Autodiscriminate UPC Composites is selected, the scanner determines if there is a 2D portion, then transmits the UPC, as well as the 2D portion if present.

UPC Never Linked
(00h)

***UPC Always Linked**
(01h)

Autodiscriminate UPC Composites
(02h)

Composite Beep Mode

Parameter # F0h, 8Eh

To select the number of decode beeps when a composite bar code is decoded, scan the appropriate bar code.

Single Beep after both are decoded
(00h)

***Beep as each code type is decoded**
(01h)

Double Beep after both are decoded
(02h)

UCC/EAN Code 128 Emulation Mode for UCC/EAN Composite Codes

Parameter # F0h, ABh

Select whether to enable or disable this mode.

Enable UCC/EAN Code 128 Emulation Mode for UCC/EAN Composite Codes
(01h)

***Disable UCC/EAN Code 128 Emulation Mode for UCC/EAN Composite Codes**
(00h)

2D Symbologies

Enable/Disable PDF417

Parameter # 0Fh

To enable or disable PDF417, scan the appropriate bar code below.

***Enable PDF417**
(01h)

Disable PDF417
(00h)

Enable/Disable MicroPDF417

Parameter # E3h

To enable or disable MicroPDF417, scan the appropriate bar code below.

Enable MicroPDF417
(01h)

***Disable MicroPDF417**
(00h)

Code 128 Emulation

Parameter # 7Bh

When this parameter is enabled, the scanner transmits data from certain MicroPDF417 symbols as if it was encoded in Code 128 symbols. Transmit AIM Symbology Identifiers must be enabled for this parameter to work.

If Code 128 Emulation is enabled, these MicroPDF417 symbols are transmitted with one of the following prefixes:

]C1 if the first codeword is 903-907, 912, 914, 915

]C2 if the first codeword is 908 or 909

]C0 if the first codeword is 910 or 911

If disabled, they are transmitted with one of the following prefixes:

]L3 if the first codeword is 903-907, 912, 914, 915

]L4 if the first codeword is 908 or 909

]L5 if the first codeword is 910 or 911

Scan a bar code below to enable or disable Code 128 Emulation.

Enable Code 128 Emulation
(01h)

***Disable Code 128 Emulation**
(00h)

Data Matrix

Parameter # F0h, 24h

To enable or disable Data Matrix, scan the appropriate bar code below.

***Enable Data Matrix**
(01h)

Disable Data Matrix
(00h)

Maxicode

Parameter # F0h, 26h

To enable or disable Maxicode, scan the appropriate bar code below.

***Enable Maxicode**
(01h)

Disable Maxicode
(00h)

QR Code

Parameter # F0h,25h

To enable or disable QR Code, scan the appropriate bar code below.

***Enable QR Code**
(01h)

Disable QR Code
(00h)

Redundancy Level
Parameter # 4Eh

The digital scanner offers four levels of decode redundancy. Select higher redundancy levels for decreasing levels of bar code quality. As redundancy levels increase, the digital scanner's aggressiveness decreases.

Select the redundancy level appropriate for the bar code quality.

Redundancy Level 1

The following code types must be successfully read twice before being decoded:

Code Type	Code Length
Codabar	8 characters or less
MSI	4 characters or less
D 2 of 5	8 characters or less
I 2 of 5	8 characters or less

Redundancy Level 2

The following code types must be successfully read twice before being decoded:

Code Type	Code Length
All	All

Redundancy Level 3

Code types other than the following must be successfully read twice before being decoded. The following codes must be read three times:

Code Type	Code Length
MSI Plessey	4 characters or less
D 2 of 5	8 characters or less
I 2 of 5	8 characters or less
Codabar	8 characters or less

Redundancy Level 4

The following code types must be successfully read three times before being decoded:

Code Type	Code Length
All	All

Redundancy Level (continued)

***Redundancy Level 1**
(01h)

Redundancy Level 2
(02h)

Redundancy Level 3
(03h)

Redundancy Level 4
(04h)

Security Level

Parameter # 4Dh

The digital scanner offers four levels of decode security for delta bar codes, which include the Code 128 family, UPC/EAN, and Code 93. Select increasing levels of security for decreasing levels of bar code quality. There is an inverse relationship between security and digital scanner aggressiveness, so choose only that level of security necessary for any given application.

- **Security Level 0:** This default setting allows the digital scanner to operate in its most aggressive state, while providing sufficient security in decoding most "in-spec" bar codes.
- **Security Level 1:** Select this option if misdecodes occur. This security level should eliminate most misdecodes.
- **Security Level 2:** Select this option if Security level 1 fails to eliminate misdecodes.
- Security Level 3: If Security Level 2 was selected and misdecodes still occur, select this security level. Be advised, selecting this option is an extreme measure against mis-decoding severely out of spec bar codes. Selecting this level of security significantly impairs the decoding ability of the digital scanner. If this level of security is necessary, try to improve the quality of the bar codes.

***Security Level 0**
(00h)

Security Level 1
(01h)

Security Level 2
(02h)

Security Level 3
(03h)

Intercharacter Gap Size

Parameter # F0h, 7Dh

The Code 39 and Codabar symbologies have an intercharacter gap that is typically quite small. Due to various bar code-printing technologies, this gap can grow larger than the maximum size allowed, preventing the digital scanner from decoding the symbol. If this problem occurs, scan the **Large Intercharacter Gaps** parameter to tolerate these out-of-specification bar codes.

***Normal Intercharacter Gaps**
(06h)

Large Intercharacter Gaps
(0Ah)

Report Version

Scan the bar code below to report the version of software currently installed in the digital scanner.

Report Software Version

Macro PDF Features

Macro PDF is a special feature for concatenating multiple PDF symbols into one file. The digital scanner can decode symbols that are encoded with this feature, and can store more than 64 kb of decoded data stored in up to 50 MacroPDF symbols.

CAUTION

When printing, keep each Macro PDF sequence separate, as each sequence has unique identifiers. Do not mix bar codes from several Macro PDF sequences, even if they encode the same data. When scanning Macro PDF sequences, scan the entire Macro PDF sequence without interruption. If, when scanning a mixed sequence, the digital scanner emits two long low beeps (Lo Lo) this indicates an inconsistent file ID or inconsistent symbology error.

Flush Macro Buffer

This flushes the buffer of all decoded Macro PDF data stored to that point, transmits it to the host device, and aborts from Macro PDF mode.

Flush Macro PDF Buffer

Abort Macro PDF Entry

This clears all currently-stored Macro PDF data in the buffer without transmission and aborts from Macro PDF mode.

Abort Macro PDF Entry

14

Miscellaneous Scanner Options

Introduction

This chapter includes commonly used bar codes to customize how data is transmitted to the host device. See *Chapter 15, Advanced Data Formatting* for further customization options.

The digital scanner ships with the settings shown in the *Miscellaneous Scanner Options Default Table on page 14-4* (also see *Appendix A, Standard Default Parameters* for all host device and miscellaneous scanner defaults). If the default values suit requirements, programming is not necessary.

To set feature values, scan a single bar code or a short bar code sequence. The settings are stored in non-volatile memory and are preserved even when the digital scanner is powered down.

Note: Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where the bar code can be seen clearly, and bars and/or spaces are not merging.

If not using a Synapse or USB cable, select a host type (see each host chapter for specific host information) after the power-up beeps sound. This is only necessary upon the first power-up when connected to a new host.

To return all features to default values, scan the **Set All Defaults* bar code on page 4-5. Throughout the programming bar code menus, default values are indicated with asterisks (*****).

* Indicates Default — ***Disable No Read** — Feature/Option

(00h) — Hex Value

Scanning Sequence Examples

In most cases, scan one bar code to set a specific parameter value. Other parameters, such as **Prefix Value**, require scanning several bar codes. See each parameter for descriptions of this procedure.

Errors While Scanning

Unless otherwise specified, to correct an error during a scanning sequence, just re-scan the correct parameter.

Miscellaneous Scanner Parameter Defaults

Table 14-1 lists the defaults for miscellaneous scanner options parameters. To change any option, scan the appropriate bar code(s) provided in the *Miscellaneous Scanner Parameters on page 14-5*.

Note

See *Appendix A, Standard Default Parameters* for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 14-1. Miscellaneous Scanner Options Default Table

Parameter	Parameter Number	Default	Page Number
Transmit Code ID Character	2Dh	None	14-5
Prefix Value	63h, 69h	7013 <CR><LF>	14-6
Suffix 1 Value Suffix 2 Value	62h, 68h 64h, 6Ah	7013 <CR><LF>	14-6
Scan Data Transmission Format	EBh	Data as is	14-7
FN1 Substitution Values	67h, 6Dh	Set	14-8
Transmit “No Read” Message	5Eh	Disable	14-9
Synapse Interface	F0h ACh	Standard	14-10

Miscellaneous Scanner Parameters

Transmit Code ID Character

Parameter # 2Dh

A Code ID character identifies the code type of a scanned bar code. This is useful when the digital scanner is decoding more than one code type. In addition to any single character prefix already selected, the Code ID character is inserted between the prefix and the decoded symbol.

Select no Code ID character, a Symbol Code ID character, or an AIM Code ID character. For Code ID Characters, see *Symbol Code Identifiers on page B-3* and *AIM Code Identifiers on page B-4*.

Symbol Code ID Character
(02h)

AIM Code ID Character
(01h)

***None**
(00h)

Prefix/Suffix Values

Key Category Parameter # P = 63h, S1 = 62h, S2 = 64h

Decimal Value Parameter # P = 69h, S1 = 68h, S2 = 6Ah

A prefix and/or one or two suffixes can be appended to scan data for use in data editing. To set a value for a prefix or suffix, scan a four-digit number (i.e., four bar codes from *Appendix D, Numeric Bar Codes*) that corresponds to that value. See *Table E-1 on page E-3* for the four-digit codes.

When using host commands to set the prefix or suffix , set the key category parameter to 1, then set the 3-digit decimal value. See *Table E-1 on page E-3* for the four-digit codes.

To correct an error or change a selection, scan *Cancel on page D-4*.

Note

To use Prefix/Suffix values, first set the *Scan Data Transmission Format on page 14-7*.

Scan Prefix
(07h)

Scan Suffix 1
(06h)

Scan Suffix 2
(08h)

Data Format Cancel

Scan Data Transmission Format

Parameter # EBh

To change the scan data format, scan one of the following eight bar codes corresponding to the desired format.

Note

If using this parameter **do not** use ADF rules to set the prefix/suffix.

To set values for the prefix and/or suffix, see *Prefix/Suffix Values on page 14-6*.

***Data As Is**
(00h)

<DATA> <SUFFIX 1>
(01h)

<DATA> <SUFFIX 2>
(02h)

<DATA> <SUFFIX 1> <SUFFIX 2>
(03h)

<PREFIX> <DATA >
(04h)

Scan Data Transmission Format (continued)

<PREFIX> <DATA> <SUFFIX 1>
(05h)

<PREFIX> <DATA> <SUFFIX 2>
(06h)

<PREFIX> <DATA> <SUFFIX 1> <SUFFIX 2>
(07h)

FN1 Substitution Values

Key Category Parameter # 67h
Decimal Value Parameter # 6Dh

The Wedge and USB HID Keyboard hosts support a FN1 Substitution feature. When enabled any FN1 character (0x1b) in an EAN128 bar code is substituted with a value. This value defaults to 7013 (Enter Key).

When using host commands to set the FN1 substitution value, set the key category parameter to 1, then set the 3-digit keystroke value. See the ASCII Character Set table for the currently installed host interface for the desired value.

To select a FN1 substitution value via bar code menus:

1. Scan the bar code below.

Set FN1 Substitution Value

2. Look up the keystroke desired for FN1 Substitution in the ASCII Character Set table for the currently installed host interface. Enter the 4-digit ASCII Value by scanning each digit in *Appendix D, Numeric Bar Codes*.

To correct an error or change the selection, scan **Cancel**.

To enable FN1 substitution for keyboard wedge, scan the **Enable FN1 Substitution** bar code on page 6-12.

To enable FN1 substitution for USB HID keyboard, scan the **Enable FN1 Substitution** bar code on page 8-10.

Transmit “No Read” Message

Parameter # 5Eh

Scan a bar code below to select whether or not to transmit a No Read message. When enabled, the characters NR are transmitted when a bar code is not decoded. When disabled, if a symbol does not decode, nothing is sent to the host.

Enable No Read
(01h)

***Disable No Read**
(00h)

Synapse Interface

Parameter # F0h, ACh

The auto-detection of a Synapse cable varies in duration depending on the type of Synapse connection. If a digital scanner is connected to another scanner using a Synapse cable, use the Auxiliary Synapse Port connection. In all other cases, where the cable is used, the default setting is recommended.

To disconnect and reconnect the digital scanner from a Synapse cable that is connected to a live host via a Synapse, use the "Plug and Play" setting. Do not change this setting from the default if an on-board wedge host is enabled.

***Standard Synapse Connection**
(01h)

Auxiliary Synapse Port Connection
(32h)

"Plug and Play" Synapse Connection
(0Ah)

15

Advanced Data Formatting

Introduction

Advanced Data Formatting (ADF) is a means of customizing data before transmission to the host device. Scan data can be edited to suit particular requirements.

ADF can be implemented through scanning a related series of bar codes, which begin on page 15-8, or by installing the 123Scan utility (see *Chapter 12, 123 Scan*) which allows the digital scanner to be setup and programmed with Advanced Data Formatting (ADF) Rules.

Avoid using ADF formatting with bar codes containing more than 60 characters. To add a prefix or suffix value for such bar codes, use Add Prefix/Suffix setting. Using ADF with longer bar codes transmits the bar code in segments of length 252 or less (depending on the host selected), and applies the rule to each segment

Note

If using the Wand interface with the digital scanner, in order to use ADF rules to format data, first enable *Convert All Bar Codes to Code 39 on page 10-8*.

Rules: Criteria Linked to Actions

In ADF, data is customized through **rules**. These rules perform detailed actions when the data meets certain criteria. One rule may consist of single or multiple criteria applied to single or multiple actions.

For instance, a data formatting rule could be the following:

Criteria: *When scan data is Code 39, length 12, and data at the start position is the string "129",*

Actions: *pad all sends with zeros to length 8,*
send all data up to X,
send a space.

If a Code 39 bar code of 1299X1559828 is scanned, the following is transmitted: 00001299<space>. If a Code 39 bar code of 1299X15598 is scanned, this rule is ignored because the length criteria has not been met.

The rule specifies the editing conditions and requirements before data transmission occurs.

Using ADF Bar Codes

When programming a rule, make sure the rule is logically correct. Plan ahead before scanning.

To program each data formatting rule:

- **Start the Rule**. Scan the **Begin New Rule** bar code on page 15-8.
- **Criteria**. Scan the bar codes for all pertinent criteria. Criteria can include code type (e.g., Code 128), code length, or data that contains a specific character string (e.g., the digits "129"). These options are described in *Criteria on page 15-11*.
- **Actions**. Scan all actions related to, or affecting, these criteria. The actions of a rule specify how to format the data for transmission. These options are described in *ADF Bar Code Menu Example on page 15-4*.
- **Save the Rule**. Scan the **Save Rule** bar code on page 15-8. This places the rule in the "top" position in the rule buffer.
- Some special-purpose bar codes can be useful to correct errors during this process:
  Erase Criteria and Start Again, **Erase Actions and Start Again**, **Erase Previously Saved Rule**, etc.

Criteria, actions, and entire rules may be erased by scanning the appropriate bar code (see page 15-9).

Beeper Definitions on page 2-4 guide through the programming steps.

ADF Bar Code Menu Example

This section provides an example of how ADF rules are entered and used for scan data.

An auto parts distribution center wants to encode manufacturer ID, part number, and destination code into their own Code 128 bar codes. The distribution center also has products that carry UPC bar codes, placed there by the manufacturer. The Code 128 bar codes have the following format:

MMMMMPPPPPDD

Where: M = Manufacturer ID

P = Part Number

D = Destination Code

The distribution center uses a PC with dedicated control characters for manufacturer ID <CTRL M>, part number <CTRL P>, and destination code <CTRL D>. At this center the UPC data is treated as manufacturer ID code.

The following rules need to be entered:

When scanning data of code type Code 128, send the next 5 characters, send the manufacturer ID key <CTRL M>, send the next 5 characters, send the part number key <CTRL P>, send the next 2 characters, send the destination code key <CTRL D>.

When scanning data of code type UPC/EAN, send all data, send the manufacturer ID key <CTRL M>.

To enter these rules, follow the steps below:

Rule 1: The Code 128 Scanning Rule

Step	Bar Code	On Page	Beep Indication
1	Begin New Rule	15-8	High High
2	Code 128	15-11	High High
3	Send next 5 characters	15-28	High High
4	Send <CTRL M>	15-48	High High
5	Send next 5 characters	15-28	High High
6	Send <CTRL P>	15-48	High High
7	Send next 2 characters	15-27	High High
8	Send <CTRL D>	15-47	High High
9	Save Rule	15-8	High Low High Low

Rule 2: The UPC Scanning Rule

Step	Bar Code	On Page	Beep Indication
1	Begin New Rule	15-8	High High
2	UPC/EAN	15-12	High High
3	Send all remaining data	15-27	High High
4	Send <CTRL M>	15-48	High High
5	Save Rule	15-8	High Low High Low

To correct any errors made while entering this rule, scan the **Quit Entering Rules** bar code on page 15-9. If the rule is already saved, scan the **Erase Previously Saved Rule** bar code on page 15-9.

Alternate Rule Sets

ADF rules may be grouped into one of four alternate sets which can be turned on and off when needed. This is useful to format the same message in different ways. For example, a Code 128 bar code contains the following information:

Class (2 digits), Stock Number (8) digits, Price (5 digits)

This bar code might look like this:

245671243701500

where:

Class = 24

Stock Number = 56712437

Price = 01500

Ordinarily, data is sent as follows:

24 (class key)

56712437 (stock key)

01500 (enter key)

But, when there is a sale, send only the following:

24 (class key)

56712437 (stock key)

and the cashier will key the price manually.

To implement this, first enter an ADF rule that applies to the normal situation, such as:

> Scan Rule Belongs to Set 1. When scanning a bar code of length 15, send the next 2 characters, send the class key, send the next 8 characters, send the stock key, send the data that remains, send the Enter key.

The “sale” rule may look like this:

> Scan Rule Belongs to Set 2. When scanning a bar code of length 15, send the next 2 characters, send the class key, send the next 8 characters, send the stock key.

To switch between the two sets of rules, a “switching rule” must be programmed. This rule specifies what type of bar code must be scanned to switch between the rule sets. For example, in the case of the “sale” rule above, the rule programmer wants the cashier to scan the bar code “M” before a sale. To do this, a rule can be entered as follows:

> When scanning a bar code of length 1 that begins with “M”, select rule set number 1.

Another rule could be programmed to switch back.

> When scanning a bar code of length 1 that begins with “N”, turn off rule set number 1.

The switching back to normal rules can also be done in the “sale” rule. For example, the rule may look like this:

> When scanning a bar code of length 15, send the next 2 characters, send the class key, send the next 8 characters, send the stock key, turn off rule set 1.

For optimal results, scan the **Disable All Rule Sets** bar code on page 15-10 after programming a rule belonging to an alternate rule set.

In addition to enabling and disabling rule sets within the rules, enable or disable them by scanning the appropriate bar codes on 15-10.

Rules Hierarchy (in Bar Codes)

The order of programming individual rules is important.The most general rule should be programmed last.

All programmed rules are stored in a buffer. As they are programmed, they are stored at the “top” of a rules list. If three rules have been created, the list would be configured as follows:

> Third Rule
>
> Second Rule
>
> First Rule

When data is scanned, the rules list is checked from top to bottom to determine if the criteria matches (and therefore, if the actions should occur). Input is modified into the data format specified by the first matching set of criteria it finds. Be sure to program the most general rule last.

For example, if the THIRD rule states:

> When scanning a bar code of any length, send all data, then send the ENTER key.

And the SECOND rule states:

> When scanning a Code 128 bar code of length 12, send the first four characters, then send the ENTER key, then send all remaining data.

If a Code 128 bar code of length 12 were scanned, the THIRD rule would be in effect. The SECOND rule would appear to not function.

Note also that ADF rules are actually created when using the standard data editing functions. Scan options are entered as ADF rules, and the hierarchy mentioned above also applies to them. For the digital scanner, this applies to prefix/suffix programming in the parameter *Scan Data Transmission Format*.

These rules reside in the same “rule list” as ADF Rules, so the order of their creation is also important.

Default Rules

Every unit has a default rule to send all scan data. Units with custom software may have one or more default rules burned in. The rules hierarchy checks user programmable rules first, then the default rules. Default rules can be disabled by entering the following general rule in the user programmable buffer:

When receiving scan data, send all data.

Since this rule always applies, ADF will never go into the default rules.

Special Commands

Pause Duration

This parameter along with the Send Pause parameter on page 15-31 allows a pause to be inserted in the data transmission. Pauses are set by scanning a two-digit number (i.e., two bar codes), and are measured in 0.1 second intervals. For example, scanning bar codes “0” and “1” inserts a 0.1 second pause; “0” and “5” inserts a 0.5 second delay. See *Appendix D, Numeric Bar Codes*. To correct an error or change a selection, scan *Cancel on page D-4*.

Pause Duration

Begin New Rule

Scan this bar code to start entering a new rule

.

Begin New Rule

Save Rule

Scan this bar code to save the rule.

Save Rule

Erase

Use these bar codes to erase criteria, actions, or rules.

Erase Criteria And Start Again

Erase Actions And Start Again

Erase Previously Saved Rule

Erase All Rules

Quit Entering Rules

Scan this bar code to quit entering rules.

Quit Entering Rules

Disable Rule Set

Use these bar codes to disable rule sets.

Disable Rule Set 1

Disable Rule Set 2

Disable Rule Set 3

Disable Rule Set 4

Disable All Rule Sets

Criteria

Code Types

Select any number of code types to be affected. All selected codes must be scanned in succession, prior to selecting other criteria. *To select all code types, do not scan any code type.*

Scan the bar codes for all code types desired before selecting other criteria.

Code 39

Codabar

RSS 14

RSS Limited

RSS Expanded

Code 128

D 2 OF 5

Code Types (continued)

IATA 2 OF 5

I 2 OF 5

Code 93

UPC-A

UPC-E

EAN-8

EAN-13

Code Types (continued)

MSI

UCC/EAN 128

UPC-E1

Bookland EAN

Trioptic Code 39

Code 11

Code 32

Code Types (continued)

ISBT 128

EAN 128

Coupon Code

US Postnet

US Planet

UK Postal

Japan Postal

Code Types (continued)

Australian Postal

Dutch Postal

PDF417

MicroPDF

Macro PDF

Macro MicroPDF

MaxiCode

Code Types (continued)

Datamatrix

QR Code

TLC 39

UPC/EAN Composites

RSS and EAN128 Composites

Note

When selecting composite bar codes, enable AIM IDs if parsing UPC or EAN composite data, or data from an application that uses symbol separators.

Code Lengths

Define the number of characters the selected code type must contain. *Do not select any code length to select code types of any length*.

Scan these bar codes to define the number of characters the selected code types must contain. Select one length per rule only.

1 Character

2 Characters

3 Characters

4 Characters

5 Characters

6 Characters

Code Lengths (continued)

7 Characters

8 Characters

9 Characters

10 Characters

11 Characters

12 Characters

13 Characters

Code Lengths (continued)

14 Characters

15 Characters

16 Characters

17 Characters

18 Characters

19 Characters

20 Characters

Code Lengths (continued)

21 Characters

22 Characters

23 Characters

24 Characters

25 Characters

26 Characters

27 Characters

Code Lengths (continued)

28 Characters

29 Characters

30 Characters

Message Containing A Specific Data String

Use this feature to select whether the formatting affects data that begins with a specific character or data string, or contains a specific character or data string.

There are 4 features:

- Specific String at Start
- Specific String, Any Location
- Any Message OK
- Rule Belongs to Set

Specific String at Start

Scan this bar code, then scan the bar codes representing the desired character or characters (up to a total of 8) in the *Alphanumeric Keyboard on page 15-90*.

After scanning the following bar code:

1. Enter a string using the *Alphanumeric Keyboard* beginning on page 15-90.
2. Scan **End of Message** on page 15-99.

Specific String At Start

Specific String, Any Location

Scan this bar code, then, using the *Numeric Keypad on page 15-24*, scan a two-digit number representing the ***position*** (use a leading "zero" if necessary). Then scan the desired character or characters (up to a total of 8) on the *Alphanumeric Keyboard on page 15-90*, followed by the **End of Message** bar code on page 15-99.

After scanning the following bar code:

1. Enter a location using the "Numeric Keypad" on page 24.
2. Enter a string using the *Alphanumeric Keyboard* beginning on page 15-90.
3. Scan **End of Message** on page 15-99.

Specific String Any Location

Any Message OK

By not scanning any bar code, all selected code types are formatted, regardless of information contained.

Numeric Keypad

Bar codes on this page should not be confused with those on the alphanumeric keyboard.

0

1

2

3

4

5

6

Numeric Keypad (continued)

7

8

9

Cancel

Rule Belongs To Set

Select the set a rule belongs to. (There are four possible rule sets.) See *Alternate Rule Sets on page 15-5* for more information about rule sets.

Scan a bar code below to select which set a rule belongs to.

Rule Belongs To Set 1

Rule Belongs To Set 2

Rule Belongs To Set 3

Rule Belongs To Set 4

Actions

Select how to format the data for transmission.

Send Data

Send all data that remains, send all data up to a specific character selected from the *Alphanumeric Keyboard on page 15-90*, or send the next N characters. N = any number from 1 to 254, selected from the *Alphanumeric Keyboard*. Use these bar codes to send data.

Send Data Up To Character

Send All Data That Remains

Send Next Character

Send Next 2 Characters

Send Next 3 Characters

Send Next 4 Characters

Send Data (continued)

Send Next 5 Characters

Send Next 6 Characters

Send Next 7 Characters

Send Next 8 Characters

Send Next 9 Characters

Send Next 10 Characters

Send Next 11 Characters

Send Data (continued)

Send Next 12 Characters

Send Next 13 Characters

Send Next 14 Characters

Send Next 15 Characters

Send Next 16 Characters

Send Next 17 Characters

Send Next 18 Characters

Send Data (continued)

Send Next 19 Characters

Send Next 20 Characters

Setup Field(s)

Table 15-1. Setup Field(s) Definitions

Parameter	Description	Page
Move Cursor		
Move Cursor To a Character	Scan the **Move Cursor To Character** bar code on page 15-31, then any printable ASCII character from the *Alphanumeric Keyboard*. When this is used, the cursor moves to the position after the matching character. If the character is not there, the rule fails and ADF tries the next rule.	15-31
Move Cursor to Start of Data	Scan this bar code to move cursor to the beginning of the data.	15-31
Move Cursor Past a Character	This parameter moves the cursor past all sequential occurrences of a selected character. For example, if the selected character is 'A', then the cursor moves past 'A', 'AA', 'AAA', etc. Scan the **Move Cursor Past Character** bar code on page 15-31, then select a character from the *Alphanumeric Keyboard*. If the character is not there, the cursor does not move (i.e., has no effect).	15-31
Skip Ahead "N" Characters	Scan one of these bar codes to select the number of positions ahead to move the cursor.	15-32
Skip Back "N" Characters	Scan one of these bar codes to select the number of positions back to move the cursor.	15-33
Send Preset Value	Send Values 1 through 6 by scanning the appropriate bar code. These values must be set using the prefix/suffix values in *Table 7-4 on page 7-21*. Value 1 = Scan Suffix Value 2 = Scan Prefix Values 3-6 are not applicable	15-35

Move Cursor

Scan a bar code below to move the cursor in relation to a specified character. Then enter a character by scanning a bar code from the *Alphanumeric Keyboard* beginning on page 15-90.

Note: If there is no match when the rule is interpreted and the rule fails, the next rule is checked.

Move Cursor To Character

Move Cursor To Start

Move Cursor Past Character

Send Pause

Scan the bar code below to insert a pause in the transmission of data. The length of this pause is controlled by the value of the Pause Duration parameter.

Send Pause

Skip Ahead

Use the following bar codes to skip ahead characters.

Skip Ahead 1 Character

Skip Ahead 2 Characters

Skip Ahead 3 Characters

Skip Ahead 4 Characters

Skip Ahead 5 Characters

Skip Ahead 7 Characters

Skip Ahead 8 Characters

Skip Ahead (continued)

Skip Ahead 9 Characters

Skip Ahead 10 Characters

Skip Ahead 6 Characters

Skip Back

Use the following bar codes to skip back characters.

Skip Back 1 Character

Skip Back 2 Characters

Skip Back 3 Characters

Skip Back (continued)

Skip Back 4 Characters

Skip Back 5 Characters

Skip Back 6 Characters

Skip Back 7 Characters

Skip Back 8 Characters

Skip Back 9 Characters

Skip Back 10 Characters

Send Preset Value

Use these bar codes to send preset values. These values must be set using the Scan Prefix and Scan Suffix bar codes on page 14-6.

Send Prefix

Send Suffix

Modify Data

Modify data in the ways listed. The following actions work for all send commands that follow it within a rule. Programming *pad zeros to length 6, send next 3 characters, stop padding, send next 5 characters,* adds three zeros to the first send, and the next send is unaffected by the padding. These options do not apply to the **Send Keystroke** or **Send Preset Value** options.

Remove All Spaces

To remove all spaces in the send commands that follow, scan this bar code.

Remove All Spaces

Crunch All Spaces

To leave one space between words, scan this bar code. This also removes all leading and trailing spaces.

Crunch All Spaces

Stop Space Removal

Scan this bar code to disable space removal.

Stop Space Removal

Remove Leading Zeros

Scan this bar code to remove all leading zeros.

Remove Leading Zeros

Stop Zero Removal

Scan this bar code to disable the removal of zeros.

Stop Zero Removal

Pad Data with Spaces

To pad data to the left, scan the bar code containing the desired number of spaces. This parameter is activated by Send commands.

Pad Spaces To Length 1

Pad Spaces To Length 2

Pad Spaces To Length 3

Pad Spaces To Length 4

Pad Spaces To Length 5

Pad Spaces To Length 6

Pad Spaces To Length 7

Pad Data with Spaces (continued)

Pad Spaces To Length 8

Pad Spaces To Length 9

Pad Spaces To Length 10

Pad Spaces To Length 11

Pad Spaces To Length 12

Pad Spaces To Length 13

Pad Spaces To Length 14

Pad Data with Spaces (continued)

Pad Spaces To Length 15

Pad Spaces To Length 16

Pad Spaces To Length 17

Pad Spaces To Length 18

Pad Spaces To Length 19

Pad Spaces To Length 20

Pad Spaces To Length 21

Pad Data with Spaces (continued)

Pad Spaces To Length 22

Pad Spaces To Length 23

Pad Spaces To Length 24

Pad Spaces To Length 25

Pad Spaces To Length 26

Pad Spaces To Length 27

Pad Spaces To Length 28

Pad Data with Spaces (continued)

Pad Spaces To Length 29

Pad Spaces To Length 30

Stop Pad Spaces

Pad Data with Zeros

To pad data to the left, scan the bar code containing the desired number of zeros. This parameter is activated by Send commands.

Pad Zeros To Length 1

Pad Zeros To Length 2

Pad Zeros To Length 3

Pad Data with Zeros (continued)

Pad Zeros To Length 4

Pad Zeros To Length 5

Pad Zeros To Length 6

Pad Zeros To Length 7

Pad Zeros To Length 8

Pad Zeros To Length 9

Pad Zeros To Length 10

Pad Data with Zeros (continued)

Pad Zeros To Length 11

Pad Zeros To Length 12

Pad Zeros To Length 13

Pad Zeros To Length 14

Pad Zeros To Length 15

Pad Zeros To Length 16

Pad Zeros To Length 17

Pad Data with Zeros (continued)

Pad Zeros To Length 18

Pad Zeros To Length 19

Pad Zeros To Length 20

Pad Zeros To Length 21

Pad Zeros To Length 22

Pad Zeros To Length 23

Pad Zeros To Length 24

Pad Data with Zeros (continued)

Pad Zeros To Length 25

Pad Zeros To Length 26

Pad Zeros To Length 27

Pad Zeros To Length 28

Pad Zeros To Length 29

Pad Zeros To Length 30

Stop Pad Zeros

Beeps

Select a beep sequence for each ADF rule.

Beep Once

Beep Twice

Beep Three Times

Send Keystroke (Control Characters and Keyboard Characters)

Control Characters

Scan the "Send __" bar code for the keystroke to send

Send Control 2

Send Control A

Send Control B

Control Characters (continued)

Send Control C

Send Control D

Send Control E

Send Control F

Send Control G

Send Control H

Send Control I

Control Characters (continued)

Send Control J

Send Control K

Send Control L

Send Control M

Send Control N

Send Control O

Send Control P

Control Characters (continued)

Send Control Q

Send Control R

Send Control S

Send Control T

Send Control U

Send Control V

Send Control W

Control Characters (continued)

Send Control X

Send Control Y

Send Control Z

Send Control [

**Send Control **

Send Control]

Control Characters (continued)

Send Control 6

Send Control -

Keyboard Characters

Scan the “Send __” bar code for the keyboard characters to send.

Send Space

Send !

Send “

Send #

Keyboard Characters (continued)

Send $

Send %

Send &

Send '

Send (

Send)

Send *

Keyboard Characters (continued)

Send +

Send ,

Send -

Send .

Send /

Send 0

Send 1

Keyboard Characters (continued)

Send 2

Send 3

Send 4

Send 5

Send 6

Send 7

Send 8

Keyboard Characters (continued)

Send 9

Send :

Send ;

Send <

Send =

Send >

Send ?

Keyboard Characters (continued)

Send @

Send A

Send B

Send C

Send D

Send E

Send F

Keyboard Characters (continued)

Send G

Send H

Send I

Send J

Send K

Send L

Send M

Keyboard Characters (continued)

Send N

Send O

Send P

Send Q

Send R

Send S

Send T

Keyboard Characters (continued)

Send U

Send V

Send W

Send X

Send Y

Send Z

Send [

Keyboard Characters (continued)

**Send **

Send]

Send ^

Send _

Send `

Send a

Send b

Keyboard Characters (continued)

Send c

Send d

Send e

Send f

Send g

Send h

Send i

Keyboard Characters (continued)

Send j

Send k

Send l

Send m

Send n

Send o

Send p

Keyboard Characters (continued)

Send q

Send r

Send s

Send t

Send u

Send v

Send w

Keyboard Characters (continued)

Send x

Send y

Send z

Send {

Send |

Send }

Send ~

Send ALT Characters

Send Alt 2

Send Alt A

Send Alt B

Send Alt C

Send Alt D

Send Alt E

Send Alt F

Send ALT Characters (continued)

Send Alt G

Send Alt H

Send Alt I

Send Alt J

Send Alt K

Send Alt L

Send Alt M

Send ALT Characters (continued)

Send Alt N

Send Alt O

Send Alt P

Send Alt Q

Send Alt R

Send Alt S

Send Alt T

Send ALT Characters (continued)

Send Alt U

Send Alt V

Send Alt W

Send Alt X

Send Alt Y

Send Alt Z

Send Alt [

Send ALT Characters (continued)

Send Alt \

Send Alt]

Send Alt 6

Send Alt -

Send Keypad Characters

Send Keypad *

Send Keypad +

Send Keypad -

Send Keypad .

Send Keypad /

Send Keypad 0

Send Keypad 1

Send Keypad Characters (continued)

Send Keypad 2

Send Keypad 3

Send Keypad 4

Send Keypad 5

Send Keypad 6

Send Keypad 7

Send Keypad 8

Send Keypad Characters (continued)

Send Keypad 9

Send Keypad Enter

Send Keypad Numlock

Send Break Key

Send Delete Key

Send Page Up Key

Send End Key

Send Keypad Characters (continued)

Send Page Down Key

Send Pause Key

Send Scroll Lock Key

Send Backspace Key

Send Tab Key

Send Print Screen Key

Send Insert Key

Send Keypad Characters (continued)

Send Home Key

Send Enter Key

Send Escape Key

Send Up Arrow Key

Send Down Arrow Key

Send Left Arrow Key

Send Right Arrow Key

Send Function Key

Send F1 Key

Send F2 Key

Send F3 Key

Send F4 Key

Send F5 Key

Send F6 Key

Send F7 Key

Send Function Key (continued)

Send F8 Key

Send F9 Key

Send F10 Key

Send F11 Key

Send F12 Key

Send F13 Key

Send F14 Key

Send Function Key (continued)

Send F15 Key

Send F16 Key

Send F17 Key

Send F18 Key

Send F19 Key

Send F20 Key

Send F21 Key

Send Function Key (continued)

Send F22 Key

Send F23 Key

Send F24 Key

Send PF1 Key

Send PF2 Key

Send PF3 Key

Send PF4 Key

Send Function Key (continued)

Send PF5 Key

Send PF6 Key

Send PF7 Key

Send PF8 Key

Send PF9 Key

Send PF10 Key

Send PF11 Key

Send Function Key (continued)

Send PF12 Key

Send PF13 Key

Send PF14 Key

Send PF15 Key

Send PF16 Key

Send PF17 Key

Send PF18 Key

Send Function Key (continued)

Send PF19 Key

Send PF20 Key

Send PF21 Key

Send PF22 Key

Send PF23 Key

Send PF24 Key

Send PF25 Key

Send Function Key (continued)

Send PF26 Key

Send PF27 Key

Send PF28 Key

Send PF29 Key

Send PF30 Key

Send Right Control Key

The “Send Right Control Key” action will send a tap (press and release) of the Right Control Key.

Send Right Control Key

Send Graphic User Interface (GUI) Characters

The "Send Graphic User Interface Character" actions will tap the specified key while holding the System Dependent Graphic User Interface (GUI) Key. The definition of the Graphic User Interface key is dependant upon the attached system:

Send GUI 0

Send GUI 1

Send GUI 2

Send GUI 3

Send GUI 4

Send GUI 5

Send Graphic User Interface (GUI) Characters (conitinued)

Send GUI 6

Send GUI 7

Send GUI 8

Send GUI 9

Send GUI A

Send GUI B

Send GUI C

Send Graphic User Interface (GUI) Characters (conitinued)

Send GUI D

Send GUI E

Send GUI F

Send GUI G

Send GUI H

Send GUI I

Send GUI J

Send Graphic User Interface (GUI) Characters (conitinued)

Send GUI K

Send GUI L

Send GUI M

Send GUI N

Send GUI O

Send GUI P

Send GUI Q

Send Graphic User Interface (GUI) Characters (conitinued)

Send GUI R

Send GUI S

Send GUI T

Send GUI U

Send GUI V

Send GUI W

Send GUI X

Send Graphic User Interface (GUI) Characters (conitinued)

Send GUI Y

Send GUI Z

Turn On/Off Rule Sets

Use these bar codes to turn rule sets on and off.

Turn On Rule Set 1

Turn On Rule Set 2

Turn On Rule Set 3

Turn On Rule Set 4

Turn On/Off Rule Sets (continued)

Use these bar codes to turn rule sets on and off.

Turn Off Rule Set 1

Turn Off Rule Set 2

Turn Off Rule Set 3

Turn Off Rule Set 4

Alphanumeric Keyboard

Space

#

$

%

*

+

-
(Dash)

Alphanumeric Keyboard (continued)

.

/

!

“

&

‘

(

Alphanumeric Keyboard (continued)

)

:

;

<

=

>

?

Alphanumeric Keyboard (continued)

@

[

\

]

^

_
(Underscore)

`

Alphanumeric Keyboard (continued)

Note: Numeric bar codes below should not be confused with those on the numeric keypad.

0

1

2

3

4

5

Alphanumeric Keyboard (continued)

6

7

8

9

A

B

C

Alphanumeric Keyboard (continued)

D

E

F

G

H

I

J

Alphanumeric Keyboard (continued)

K

L

M

N

O

P

Q

Alphanumeric Keyboard (continued)

R

S

T

U

V

W

X

Alphanumeric Keyboard (continued)

Y

Z

Cancel

End of Message

a

b

c

Alphanumeric Keyboard (continued)

d

e

f

g

h

i

j

Alphanumeric Keyboard (continued)

k

l

m

n

o

p

q

Alphanumeric Keyboard (continued)

r

s

t

u

v

w

x

Alphanumeric Keyboard (continued)

y

z

{

|

}

~

A

Standard Default Parameters

Table A-1. Standard Default Parameters Table

Parameter	Parameter Number	Default	Page Number
User Preferences			
Set Default Parameter		All Defaults	4-5
Parameter Scanning	ECh	Enable	4-5
Beeper Tone	91h	Medium	4-6
Beeper Volume	8Ch	High	4-7
Power Mode	80h	Continuous On	4-7
Time Delay to Low Power Mode	92h	5 Minutes	4-8
Trigger Mode	8Ah	Level	4-9
Decode Session Timeout	88h	9.9 Sec	4-10
Timeout Between Decodes, Same Symbol	89h	0.6 Sec	4-10
Beep After Good Decode	38h	Enable	4-11
Scanstand Session Timeout	F0h 90h	2 Seconds	4-11
Decoding Preferences			
Decoding Illumination	F0h 2Ah	Enable	5-5
Decode Aiming Pattern	F0h 32h	Enable	5-5
Keyboard Wedge Host Parameters			
Keyboard Wedge Host Type		IBM PC/AT& IBM PC Compatibles[1]	6-5
Country Types (Country Codes)		North American	6-6
Ignore Unknown Characters		Transmit	6-8
Keystroke Delay		No Delay	6-8
Intra-Keystroke Delay		Disable	6-9
Alternate Numeric Keypad Emulation		Disable	6-9
Caps Lock On		Disable	6-10
Caps Lock Override		Disable	6-10
Convert Wedge Data		No Convert	6-11
[1]User selection is required to configure this interface and this is the most common selection.			

Table A-1. Standard Default Parameters Table (Continued)

Parameter	Parameter Number	Default	Page Number
Function Key Mapping		Disable	6-11
FN1 Substitution		Disable	6-12
Send and Make Break		Send	6-12
RS-232 Host Parameters			
RS-232 Host Types		Standard[1]	7-8
Baud Rate		9600	7-9
Parity Type		None	7-11
Stop Bit Select		1 Stop Bit	7-12
Data Bits		8-Bit	7-12
Check Receive Errors		Enable	7-13
Hardware Handshaking		None	7-14
Software Handshaking		None	7-16
Host Serial Response Time-out		2 Sec	7-17
RTS Line State		Low RTS	7-18
Beep on <BEL>		Disable	7-18
Intercharacter Delay		0 msec	7-19
Nixdorf Beep/LED Options		Normal Operation	7-20
Ignore Unknown Characters		Send Bar Code	7-20
USB Host Parameters			
USB Device Type		HID Keyboard Emulation	8-5
USB Country Keyboard Types (Country Codes)		North American	8-6
USB Keystroke Delay		No Delay	8-8
USB CAPS Lock Override		Disable	8-8
USB Ignore Unknown Characters		Enable	8-9
Emulate Keypad		Disable	8-9
USB Keyboard FN1 Substitution		Disable	8-10
Function Key Mapping		Disable	8-10

[1]User selection is required to configure this interface and this is the most common selection.

Table A-1. Standard Default Parameters Table (Continued)

Parameter	Parameter Number	Default	Page Number
Simulated Caps Lock		Disable	8-11
Convert Case		No Case Conversion	8-11
IBM 468X/469X Host Parameters			
Port Address		None Selected	9-5
Convert Unknown to Code 39		Disable	9-6
Wand Emulation Host Parameters			
Wand Emulation Host Types		Symbol OmniLink Interface Controller[1]	10-5
Leading Margin		80 msec	10-6
Polarity		Bar High/Margin Low	10-7
Ignore Unknown Characters		Ignore	10-8
Convert All Bar Codes to Code 39		Disable	10-8
Convert Code 39 to Full ASCII		Disable	10-9
Undecoded Scanner Emulation			
Beep Style		Beep on Successful Transmit	11-5
Parameter Pass-Through		Parameter Process and Pass Through	11-6
Convert Newer Code Types		Convert Newer Code Types	11-7
Module Width		20 µs	11-8
Convert All Bar Codes to Code 39		Do Not Convert to Code 39	11-8
Code 39 Full ASCII Conversion		Disable	11-9
Transmission Timeout		3 seconds	11-9
Ignore Unknown Characters		Ignore Unknown Characters	11-10
Leading Margin		2 ms	11-11
Check for Decode LED		Check for Decode LED	11-12
123Scan Configuration Tool			
123Scan Configuration		None[1]	12-3
UPC/EAN			
UPC-A	01h	Enable	13-10
[1]User selection is required to configure this interface and this is the most common selection.			

Table A-1. Standard Default Parameters Table (Continued)

Parameter	Parameter Number	Default	Page Number
UPC-E	02h	Enable	13-10
UPC-E1	0Ch	Disable	13-11
EAN-8/JAN 8	04h	Enable	13-11
EAN-13/JAN 13	03h	Enable	13-12
Bookland EAN	53h	Disable	13-12
Decode UPC/EAN/JAN Supplementals (2 and 5 digits)	10h	Ignore	13-13
UPC/EAN/JAN Supplemental Redundancy	50h	10	13-14
Transmit UPC-A Check Digit	28h	Enable	13-15
Transmit UPC-E Check Digit	29h	Enable	13-15
Transmit UPC-E1 Check Digit	2Ah	Enable	13-16
UPC-A Preamble	22h	System Character	13-16
UPC-E Preamble	23h	System Character	13-17
UPC-E1 Preamble	24h	System Character	13-18
Convert UPC-E to A	25h	Disable	13-18
Convert UPC-E1 to A	26h	Disable	13-19
EAN-8/JAN-8 Extend	27h	Disable	13-19
UCC Coupon Extended Code	55h	Disable	13-20
Code 128			
Code 128	08h	Enable	13-20
UCC/EAN-128	0Eh	Enable	13-21
ISBT 128	54h	Enable	13-21
Code 39			
Code 39	00h	Enable	13-22
Trioptic Code 39	0Dh	Disable	13-22
Convert Code 39 to Code 32 (Italian Pharmacy Code)	56h	Disable	13-23
Code 32 Prefix	E7h	Disable	13-23
Set Length(s) for Code 39	12h 13h	2 to 55	13-24
[1]User selection is required to configure this interface and this is the most common selection.			

Table A-1. Standard Default Parameters Table (Continued)

Parameter	Parameter Number	Default	Page Number
Code 39 Check Digit Verification	30h	Disable	13-25
Transmit Code 39 Check Digit	2Bh	Disable	13-26
Code 39 Full ASCII Conversion	11h	Disable	13-26
Buffer Code 39	71h	Disable	13-27
Code 93			
Code 93	09h	Disable	13-29
Set Length(s) for Code 93	1Ah 1Bh	4 to 55	13-30
Code 11			
Code 11	0Ah	Disable	13-31
Set Lengths for Code 11	1Ch 1Dh	4 to 55	13-32
Code 11 Check Digit Verification	34h	Disable	13-33
Transmit Code 11 Check Digit(s)	2Fh	Disable	13-34
Interleaved 2 of 5 (ITF)			
Interleaved 2 of 5 (ITF)	06h	Enable	13-34
Set Lengths for I 2 of 5	16h 17h	14	13-35
I 2 of 5 Check Digit Verification	31h	Disable	13-36
Transmit I 2 of 5 Check Digit	2Ch	Disable	13-37
Convert I 2 of 5 to EAN 13	52h	Disable	13-37
Discrete 2 of 5 (DTF)			
Discrete 2 of 5	05h	Disable	13-38
Set Length(s) for D 2 of 5	14h 15h	12	13-38
Codabar (NW - 7)			
Codabar	07h	Disable	13-39
Set Lengths for Codabar	18h 19h	5 to 55	13-40
CLSI Editing	36h	Disable	13-41
NOTIS Editing	37h	Disable	13-41
[1]User selection is required to configure this interface and this is the most common selection.			

Table A-1. Standard Default Parameters Table (Continued)

Parameter	Parameter Number	Default	Page Number
MSI			
MSI	0Bh	Disable	13-42
Set Length(s) for MSI	1Eh 1Fh	1 to 55	13-42
MSI Check Digits	32h	One	13-43
Transmit MSI Check Digit	2Eh	Disable	13-44
MSI Check Digit Algorithm	33h	Mod 10/Mod 10	13-44
Postal Codes			
US Postnet	59h	Enable	13-45
US Planet	5Ah	Enable	13-45
UK Postal	5Bh	Enable	13-46
Transmit UK Postal Check Digit	60h	Enable	13-46
Japan Postal	F0h 22h	Enable	13-47
Australian Postal	F0h 23h	Enable	13-47
Dutch Postal	F0h 46h	Enable	13-48
Transmit US Postal Check Digit	5Fh	Enable	13-48
RSS (Reduced Space Symbology)			
RSS 14	F0h 52h	Enable	13-49
RSS Limited	F0h 53h	Enable	13-49
RSS Expanded	F0h 54h	Enable	13-50
Convert RSS to UPC/EAN	F0h 8Dh	Disable	13-50
Composite			
Composite CC-C	F0h 55h	Disable	13-51
Composite CC-A/B	F0h 56h	Disable	13-51
Composite TLC-39	F0h 73h	Disable	13-52
UPC Composite Mode	F0h 58h	Always Linked	13-53
Composite Beep Mode	F0h 8Eh	Beep As Each Code Type is Decoded	13-54
[1]User selection is required to configure this interface and this is the most common selection.			

Table A-1. Standard Default Parameters Table (Continued)

Parameter	Parameter Number	Default	Page Number
UCC/EAN Code 128 Emulation Mode for UCC/EAN Composite Codes	F0h ABh	Disable	13-54
2D Symbologies			
PDF417	0Fh	Enable	13-55
MicroPDF417	E3h	Disable	13-55
Code 128 Emulation	7Bh	Disable	13-56
Data Matrix	F0h 24h	Enable	13-57
Maxicode	F0h 26h	Enable	13-57
QR Code	F0h 25h	Enable	13-58
Symbology-Specific Security Levels			
Redundancy Level	4Eh	1	13-59
Security Level	4Dh	0	13-61
Intercharacter Gap Size	F0h 7Dh	Normal	13-62
Report Version			13-62
Macro PDF			
Flush Macro PDF Buffer			13-63
Abort Macro PDF Entry			13-63
Miscellaneous Scanner Options			
Transmit Code ID Character	2Dh	None	14-5
Prefix Value	63h, 69h	7013 <CR><LF>	14-6
Suffix 1 Value Suffix 2 Value	62h, 68h 64h, 6Ah	7013 <CR><LF>	14-6
Scan Data Transmission Format	EBh	Data as is	14-7
FN1 Substitution Values	67h, 6Dh	Set	14-8
Transmit “No Read” Message	5Eh	Disable	14-9
Synapse Interface	F0h ACh	Standard	14-10
[1]User selection is required to configure this interface and this is the most common selection.			

B

Programming Reference

Symbol Code Identifiers

Table B-1. Symbol Code Characters

Code Character	Code Type
A	UPC-A, UPC-E, UPC-E1, EAN-8, EAN-13
B	Code 39, Code 32
C	Codabar
D	Code 128
E	Code 93
F	Interleaved 2 of 5
G	Discrete 2 of 5, or Discrete 2 of 5 IATA
H	Code 11
J	MSI
K	UCC/EAN-128
L	Bookland EAN
M	Trioptic Code 39
N	Coupon Code
R	RSS Family
T	UCC Composite, TLC 39
X	PDF417, Macro PDF417, Micro PDF417
P00	Data Matrix
P01	QR Code
P02	Maxicode
P03	US Postnet
P04	US Planet
P05	Japan Postal
P06	UK Postal
P08	Dutch Postal
P09	Australian Postal
P09	UK Postal

AIM Code Identifiers

Each AIM Code Identifier contains the three-character string **]cm** where:

] = Flag Character (ASCII 93)
c = Code Character (see Table B-2)
m = Modifier Character (see Table B-3)

Table B-2. Aim Code Characters

Code Character	Code Type
A	Code 39, Code 39 Full ASCII, Code 32
C	Code 128, Coupon (Code 128 portion)
d	Data Matrix
E	UPC/EAN, Coupon (UPC portion)
e	RSS Family
F	Codabar
G	Code 93
H	Code 11
I	Interleaved 2 of 5
L	PDF417, Macro PDF417, Micro PDF417
M	MSI
Q	QR Code
S	Discrete 2 of 5, IATA 2 of 5
U	Maxicode
X	Bookland EAN, Trioptic Code 39, US Postnet, US Planet, UK Postal, Japan Postal, Australian Postal, Dutch Postal

The modifier character is the sum of the applicable option values based on Table B-3.

Table B-3. Modifier Characters

Code Type	Option Value	Option
Code 39	0	No check character or Full ASCII processing.
	1	Reader has checked one check character.
	3	Reader has checked and stripped check character.
	4	Reader has performed Full ASCII character conversion.
	5	Reader has performed Full ASCII character conversion and checked one check character.
	7	Reader has performed Full ASCII character conversion and checked and stripped check character.
	Example: A Full ASCII bar code with check character W, **A+I+MI+DW**, is transmitted as **]A7**AIMID where 7 = (3+4).	
Trioptic Code 39	0	No option specified at this time. Always transmit 0.
	Example: A Trioptic bar code 412356 is transmitted as **]X0**412356	
Code 128	0	Standard data packet, no Function code 1 in first symbol position.
	1	Function code 1 in first symbol character position.
	2	Function code 1 in second symbol character position.
	Example: A Code (EAN) 128 bar code with Function 1 character ^{FNC1} in the first position, AIMID is transmitted as **]C1**AIMID	
I 2 of 5	0	No check digit processing.
	1	Reader has validated check digit.
	3	Reader has validated and stripped check digit.
	Example: An I 2 of 5 bar code without check digit, 4123, is transmitted as **]I0**4123	
Codabar	0	No check digit processing.
	1	Reader has checked check digit.
	3	Reader has stripped check digit before transmission.
	Example: A Codabar bar code without check digit, 4123, is transmitted as **]F0**4123	
Code 93	0	No options specified at this time. Always transmit 0.
	Example: A Code 93 bar code 012345678905 is transmitted as **]G0**012345678905	
MSI	0	Check digits are sent.
	1	No check digit is sent.
	Example: An MSI bar code 4123, with a single check digit checked, is transmitted as **]M1**4123	
D 2 of 5	0	No options specified at this time. Always transmit 0.
	Example: A D 2 of 5 bar code 4123, is transmitted as **]S0**4123	
UPC/EAN	0	Standard packet in full EAN country code format, which is 13 digits for UPC-A and UPC-E (not including supplemental data).
	1	Two-digit supplement data only.
	2	Five-digit supplement data only.
	4	EAN-8 data packet.
	Example: A UPC-A bar code 012345678905 is transmitted as **]E0**0012345678905	

Table B-3. Modifier Characters (Continued)

Code Type	Option Value	Option
Bookland EAN	0	No options specified at this time. Always transmit 0.
	Example: A Bookland EAN bar code 123456789X is transmitted as **]X0**123456789X	
Code 11	0	Single check digit
	1	Two check digits
	3	Check characters validated but not transmitted.
RSS Family		No option specified at this time. Always transmit 0. RSS-14 and RSS-Limited transmit with an Application Identifier “01”. Note: In UCC/EAN-128 emulation mode, RSS is transmitted using Code 128 rules (i.e.,]C1).
	Example: An RSS-14 bar code 100123456788902 is transmitted as **]e**001100123456788902.	
EAN.UCC Composites (RSS, UCC/EAN-128, 2D portion of UPC composite)		Native mode transmission. Note: UPC portion of composite is transmitted using UPC rules.
	0	Standard data packet.
	1	Data packet containing the data following an encoded symbol separator character.
	2	Data packet containing the data following an escape mechanism character. The data packet does not support the ECI protocol.
	3	Data packet containing the data following an escape mechanism character. The data packet supports the ECI protocol.
		UCC/EAN-128 emulation Note: UPC portion of composite is transmitted using UPC rules.
	1	Data packet is a UCC/EAN-128 symbol (i.e., data is preceded with]JC1).
PDF417, Micro PDF417	0	Reader set to conform to protocol defined in 1994 PDF417 symbology specifications. **Note:** When this option is transmitted, the receiver cannot reliably determine whether ECIs have been invoked or whether data byte 92_{DEC} has been doubled in transmission.
	1	Reader set to follow the ECI protocol (Extended Channel Interpretation). All data characters 92_{DEC} are doubled.
	2	Reader set for Basic Channel operation (no escape character transmission protocol). Data characters 92_{DEC} are not doubled. **Note:** When decoders are set to this mode, unbuffered Macro symbols and symbols requiring the decoder to convey ECI escape sequences cannot be transmitted.
	3	The bar code contains a UCC/EAN-128 symbol, and the first codeword is 903-907, 912, 914, 915.
	4	The bar code contains a UCC/EAN-128 symbol, and the first codeword is in the range 908-909.
	5	The bar code contains a UCC/EAN-128 symbol, and the first codeword is in the range 910-911.
	Example: A PDF417 bar code ABCD, with no transmission protocol enabled, is transmitted as]L2ABCD.	
Data Matrix	0	ECC 000-140, not supported.
	1	ECC 200.
	2	ECC 200, FNC1 in first or fifth position.
	3	ECC 200, FNC1 in second or sixth position.
	4	ECC 200, ECI protocol implemented.
	5	ECC 200, FNC1 in first or fifth position, ECI protocol implemented.
	6	ECC 200, FNC1 in second or sixth position, ECI protocol implemented.

Table B-3. Modifier Characters (Continued)

Code Type	Option Value	Option
MaxiCode	0	Symbol in Mode 4 or 5.
	1	Symbol in Mode 2 or 3.
	2	Symbol in Mode 4 or 5, ECI protocol implemented.
	3	Symbol in Mode 2 or 3, ECI protocol implemented in secondary message.
QR Code	0	Model 1 symbol.
	1	Model 2 symbol, ECI protocol not implemented.
	2	Model 2 symbol, ECI protocol implemented.
	3	Model 2 symbol, ECI protocol not implemented, FNC1 implied in first position.
	4	Model 2 symbol, ECI protocol implemented, FNC1 implied in first position.
	5	Model 2 symbol, ECI protocol not implemented, FNC1 implied in second position.
	6	Model 2 symbol, ECI protocol implemented, FNC1 implied in second position.

C

Sample Bar Codes

Code 39

123ABC

UPC/EAN

UPC-A, 100 %

0 12345 67890 5

EAN-13, 100 %

3 456789 012340

Code 128

12345678901234567890123456789012345678901234

Interleaved 2 of 5

12345678901231

RSS 14

Note

RSS 14 must be enabled to read the bar code below (see *RSS-14* on page 13-49).

7612341562341

PDF417

Data Matrix

Maxicode

QR Code

US Postnet

0123456784

UK Postal

001ABCD1AB9MX

D

Numeric Bar Codes

Numeric Bar Codes

For parameters requiring specific numeric values, scan the appropriately numbered bar code(s).

0

1

2

3

4

5

Numeric Bar Codes

For parameters requiring specific numeric values, scan the appropriately numbered bar code(s).

6

7

8

9

Cancel

To correct an error or change a selection, scan the bar code below.

Cancel

E

ASCII Character Sets

Table E-1. ASCII Value Table

ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
1000	%U	CTRL 2
1001	$A	CTRL A
1002	$B	CTRL B
1003	$C	CTRL C
1004	$D	CTRL D
1005	$E	CTRL E
1006	$F	CTRL F
1007	$G	CTRL G
1008	$H	CTRL H/**BACKSPACE**[1]
1009	$I	CTRL I/**HORIZONTAL TAB**[1]
1010	$J	CTRL J
1011	$K	CTRL K
1012	$L	CTRL L
1013	$M	CTRL M/**ENTER**[1]
1014	$N	CTRL N
1015	$O	CTRL O
1016	$P	CTRL P
1017	$Q	CTRL Q
1018	$R	CTRL R
1019	$S	CTRL S
1020	$T	CTRL T
1021	$U	CTRL U
1022	$V	CTRL V
1023	$W	CTRL W
1024	$X	CTRL X

The keystroke in bold is sent only if the Function Key Mapping is enabled. Otherwise, the unbold keystroke is sent.

Table E-1. ASCII Value Table (Continued)

ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
1025	$Y	CTRL Y
1026	$Z	CTRL Z
1027	%A	CTRL [
1028	%B	CTRL \
1029	%C	CTRL]
1030	%D	CTRL 6
1031	%E	CTRL -
1032	Space	Space
1033	/A	!
1034	/B	“
1035	/C	#
1036	/D	$
1037	/E	%
1038	/F	&
1039	/G	‘
1040	/H	(
1041	/I	)
1042	/J	*
1043	/K	+
1044	/L	,
1045	-	-
1046	.	.
1047	/o	/
1048	0	0
1049	1	1
1050	2	2
1051	3	3
The keystroke in bold is sent only if the Function Key Mapping is enabled. Otherwise, the unbold keystroke is sent.		

Table E-1. ASCII Value Table (Continued)

ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
1052	4	4
1053	5	5
1054	6	6
1055	7	7
1056	8	8
1057	9	9
1058	/Z	:
1059	%F	;
1060	%G	<
1061	%H	=
1062	%I	>
1063	%J	?
1064	%V	@
1065	A	A
1066	B	B
1067	C	C
1068	D	D
1069	E	E
1070	F	F
1071	G	G
1072	H	H
1073	I	I
1074	J	J
1075	K	K
1076	L	L
1077	M	M
1078	N	N
The keystroke in bold is sent only if the Function Key Mapping is enabled. Otherwise, the unbold keystroke is sent.		

Table E-1. ASCII Value Table (Continued)

ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
1079	O	O
1080	P	P
1081	Q	Q
1082	R	R
1083	S	S
1084	T	T
1085	U	U
1086	V	V
1087	W	W
1088	X	X
1089	Y	Y
1090	Z	Z
1091	%K	[
1092	%L	\
1093	%M	]
1094	%N	^
1095	%O	_
1096	%W	‘
1097	+A	a
1098	+B	b
1099	+C	c
1100	+D	d
1101	+E	e
1102	+F	f
1103	+G	g
1104	+H	h
1105	+I	i
The keystroke in bold is sent only if the Function Key Mapping is enabled. Otherwise, the unbold keystroke is sent.		

Table E-1. ASCII Value Table (Continued)

ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
1106	+J	j
1107	+K	k
1108	+L	l
1109	+M	m
1110	+N	n
1111	+O	o
1112	+P	p
1113	+Q	q
1114	+R	r
1115	+S	s
1116	+T	t
1117	+U	u
1118	+V	v
1119	+W	w
1120	+X	x
1121	+Y	y
1122	+Z	z
1123	%P	{
1124	%Q	|
1125	%R	}
1126	%S	~
The keystroke in bold is sent only if the Function Key Mapping is enabled. Otherwise, the unbold keystroke is sent.		

Table E-2. ALT Key Standard Default Tables

ALT Keys	Keystroke
2064	ALT 2
2065	ALT A
2066	ALT B
2067	ALT C
2068	ALT D
2069	ALT E
2070	ALT F
2071	ALT G
2072	ALT H
2073	ALT I
2074	ALT J
2075	ALT K
2076	ALT L
2077	ALT M
2078	ALT N
2079	ALT O
2080	ALT P
2081	ALT Q
2082	ALT R
2083	ALT S
2084	ALT T
2085	ALT U
2086	ALT V
2087	ALT W
2088	ALT X
2089	ALT Y
2090	ALT Z

Table 5-3. USB GUI Key Character Set

GUI Key	Keystroke
3000	Right Control Key
3048	GUI 0
3049	GUI 1
3050	GUI 2
3051	GUI 3
3052	GUI 4
3053	GUI 5
3054	GUI 6
3055	GUI 7
3056	GUI 8
3057	GUI 9
3065	GUI A
3066	GUI B
3067	GUI C
3068	GUI D
3069	GUI E
3070	GUI F
3071	GUI G
3072	GUI H
3073	GUI I
3074	GUI J
3075	GUI K
3076	GUI L
3077	GUI M
3078	GUI N
3079	GUI O
3080	GUI P
3081	GUI Q
3082	GUI R
3083	GUI S
3084	GUI T
3085	GUI U
3086	GUI V
Note: GUI Shift Keys - The Apple™ iMac keyboard has an apple key on either side of the space bar. Windows-based systems have a GUI key to the left of the left ALT key, and to the right of the right ALT key.	

Table 5-3. USB GUI Key Character Set (Continued)

GUI Key	Keystroke
3087	GUI W
3088	GUI X
3089	GUI Y
3090	GUI Z
Note: GUI Shift Keys - The Apple™ iMac keyboard has an apple key on either side of the space bar. Windows-based systems have a GUI key to the left of the left ALT key, and to the right of the right ALT key.	

Table E-4. PF Key Standard Default Table

PF Keys	Keystroke
4001	PF 1
4002	PF 2
4003	PF 3
4004	PF 4
4005	PF 5
4006	PF 6
4007	PF 7
4008	PF 8
4009	PF 9
4010	PF 10
4011	PF 11
4012	PF 12
4013	PF 13
4014	PF 14
4015	PF 15
4016	PF 16

Table E-5. F key Standard Default Table

F Keys	Keystroke
5001	F 1
5002	F 2
5003	F 3
5004	F 4
5005	F 5
5006	F 6
5007	F 7
5008	F 8
5009	F 9
5010	F 10
5011	F 11
5012	F 12
5013	F 13
5014	F 14
5015	F 15
5016	F 16
5017	F 17
5018	F 18
5019	F 19
5020	F 20
5021	F 21
5022	F 22
5023	F 23
5024	F 24

Table E-6. Numeric Key Standard Default Table

Numeric Keypad	Keystroke
6042	*
6043	+
6044	Undefined
6045	-
6046	.
6047	/

Table E-6. Numeric Key Standard Default Table (Continued)

Numeric Keypad	Keystroke
6048	0
6049	1
6050	2
6051	3
6052	4
6053	5
6054	6
6055	7
6056	8
6057	9
6058	Enter
6059	Num Lock

Table E-7. Extended Keypad Standard Default Table

Extended Keypad	Keystroke
7001	Break
7002	Delete
7003	Pg Up
7004	End
7005	Pg Dn
7006	Pause
7007	Scroll Lock
7008	Backspace
7009	Tab
7010	Print Screen
7011	Insert
7012	Home
7013	Enter
7014	Escape
7015	Up Arrow
7016	Dn Arrow
7017	Left Arrow
7018	Right Arrow

Glossary

AIM	Automatic Identification Manufacturers, Inc. is the trade association for manufacturers of automatic identification systems.
Alphanumeric	A character set that contains letters, numbers and other characters such as special symbols.
Aperture	The opening in an optical system defined by a lens or baffle that establishes the field of view.
ASCII	American Standard Code for Information Interchange. A 7-bit-plus-parity code representing 128 letters, numerals, punctuation marks, and control characters. It is a standard data transmission code in the U.S.
Aspect Ratio	The ratio of symbol height to symbol length in a 2-dimensional symbol.
Autodiscrimination	The ability of an interface controller to determine the code type of a scanned bar code. After this determination is made, the information content is decoded.
Automatic Identification System	The application of various technologies, such as bar code recognition, image recognition, voice recognition and RF/MW transponders, for the purpose of data entry into a data processing system and bypassing the key-entry component of traditional data entry.
Background	The area surrounding a printed symbol including the spaces and quiet zones.
Bar	The dark element in a printed bar code symbol.
Bar Code	An array of parallel rectangular bars and spaces arranged according to the encodation rules of a particular symbol specification in order to represent data in machine-readable form (i.e., Code 39).
Bar Code Character	A single group of bars and spaces which represent an individual number, letter, punctuation mark or other symbol.

Bar Code Density The number of characters represented per unit of measurement (e.g., characters per inch).

Bar Code Reader A device used to read or decode a bar code symbol.

Bar Code Symbol The combination of symbol characters and features required by a particular symbology, including quiet zones, start and stop characters, data characters, check characters and other auxiliary patterns, that together form a complete scannable entity (see symbol).

Bar Height The dimension of a bar measured perpendicular to the bar width.

or

The dimension of the individual bars in a bar code symbol or in a row of a multi-row, 2-dimensional symbol that is measured perpendicular to the scanning direction (see Y dimension).

Bar Width Thickness of a bar measured from the edge closest to the symbol start character to the trailing edge of the same bar.

or

The transverse dimension of an individual bar in a bar code symbol that is measured parallel to the scanning direction. The number of possible width variations within a particular printed symbol depends on the symbology used (see X dimension).

Baud Rate A measure of the data flow or number of signaling events occurring per second. When one bit is the standard "event," this is a measure of bits per second (bps). For example, a baud rate of 50 means transmission of 50 bits of data per second.

Bi-directional Denotes that a machine-readable symbol can be read successfully in two directions – either backwards or forwards. Also identifies a scanner that can operate or a bar code that can be read independent of scanning direction.

Binary Denotes a numbering system to base 2 in which numbers are expressed as combinations of the digits 0 and 1 with positional weighting based on powers of 2. In computing, these can be represented electrically by 'off' and 'on' respectively or in machine-readable symbols by narrow and wide elements or by the absence or presence of a bar module.

Bit Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.

Byte On an addressable boundary, eight adjacent binary digits (0 and 1) combined in a pattern to represent a specific character or numeric value. Bits are numbered from the right, 0 through 7, with bit 0 the low-order bit. One byte in memory is used to store one ASCII character.

or

A sequential series of bits comprising one character and handled as one unit. Usually encoded in the ASCII format, a byte usually consists of eight bits and represents one alphabetic or special character, two decimal digits or eight binary bits.

CDRH Center for Devices and Radiological Health. A federal agency responsible for regulating laser product safety. This agency specifies various laser operation classes based on power output during operation.

CDRH Class 1 This is the lowest power CDRH laser classification. This class is considered intrinsically safe, even if all laser output were directed into the eye's pupil. There are no special operating procedures for this class.

CDRH Class 2 No additional software mechanisms are needed to conform to this limit. Laser operation in this class poses no danger for unintentional direct human exposure.

Character A pattern of bars and spaces which either directly represents data or indicates a control function, such as a number, letter, punctuation mark, or communications control contained in a message.

Character Set Those characters available for encoding in a particular bar code symbology.

Check Digit A digit used to verify a correct symbol decode. The scanner inserts the decoded data into an arithmetic formula and checks that the resulting number matches the encoded check digit. Check digits are required for UPC but are optional for other symbologies. Using check digits decreases the chance of substitution errors when a symbol is decoded.

Codabar A discrete self-checking code with a character set consisting of digits 0 to 9 and six additional characters: (- $: / , +).

Code A set of unambiguous rules specifying the way in which data may be represented as numbers and letters used to represent information (see number system).

Code 128 A high density symbology which allows the controller to encode all 128 ASCII characters without adding extra symbol elements.

Code 3 of 9 (Code 39) A versatile and widely used alphanumeric bar code symbology with a set of 43 character types, including all uppercase letters, numerals from 0 to 9, and 7 special characters (- . / + % $ and space). The code name is derived from the fact that 3 of 9 elements representing a character are wide, while the remaining 6 are narrow.

Code 93 An industrial symbology compatible with Code 39 but offering a full character ASCII set and a higher coding density than Code 39.

Code Length Number of data characters in a bar code between the start and stop characters, not including those characters.

Codeword As a symbol character value, this isan intermediate level of coding between source data and the graphical encodation in the symbol.

Concatination The construction of a string of data from two or more strings by appending each string in succession. The linking or chaining together of separate items of data in a bar code symbol or of the data contained in two or more separate bar code symbols (also referred to as message append and structured append).

Continuous Code A bar code or symbol in which all spaces within the symbol are parts of characters. There are no intercharacter gaps in a continuous code. The absence of gaps allows for greater information density.

Contrast The difference in reflectance between the black and white (or bar and space) areas of a symbol.

Data Identifier A specified character or string of characters that defines the intended use of the data element that follows. For the purposes of automatic data capture technologies, data identifier refers to the alphanumeric identifiers as defined in ANSI MH10.8.2, formerly known as ANSI/FACT data identifiers.

Data Matrix
This error correcting, 2-dimensional matrix symbology was originally developed in 1989, and a finalized design was completed in 1995 by International Data Matrix. It's capable of encoding various character sets including strictly numeric data, alphanumeric data and all ISO 646 (ASCII) characters, as well as special character sets. The symbology has both error detection and error correction features. Each Data Matrix symbol consists of data regions, which contain nominally square modules set out in a regular array. A dark module is a binary 1 and a light module is a binary 0. There is no specified minimum or maximum for the X or Y dimension. The data region is surrounded by a finder pattern, a perimeter to the data region that is 1 module wide, which is surrounded by a quiet zone on all four sides of the symbol. Two adjacent sides are solid dark lines used primarily to define physical size, orientation and symbol distortion. The two opposite sides consist of alternating dark and light modules. These are used primarily to define the cell structure but also assist in determining physical size and distortion. There are 2 types of Data Matrix symbologies: ECC 000 - 140 with several available levels of convolutional error correction, and ECC 200, which uses Reed-Solomon error correction. For ISO/IEC JTC 1/SC 31 purposes, only ECC 200 is recommended. The intellectual property rights associated with Data Matrix have been committed to the public domain.

Data Structure
The stipulation of the type of information that is included in a bar code, such as its order and format.

Dead Zone
An area within a scanner's field of view, in which specular reflection may prevent a successful decode.

Decode
To recognize a bar code symbology (e.g., UPC/EAN) and then analyze the content of the specific bar code scanned.

Decode Algorithm
A decoding scheme that converts pulse widths into data representation of the letters or numbers encoded within a bar code symbol.

Decoder
An electronic package that receives the signals from the scanning function, performs the algorithm to interpret the signals into meaningful data and provides the interface to other devices.

Depth of Field
The range between minimum and maximum distances at which a scanner can read a symbol with a certain minimum element width.

Diffuse Reflection
The component of reflected light that emanates in all directions from the reflecting surface.

Discrete 2 of 5
A binary bar code symbology representing each character by a group of five bars, two of which are wide. The location of wide bars in the group determines which character is encoded; spaces are insignificant. Only numeric characters (0 to 9) and START/STOP characters may be encoded.

Discrete Code
A bar code or symbol in which the spaces between characters (intercharacter gaps) are not part of the code.

EAN
European Article Number. This European/International version of the UPC provides its own coding format and symbology standards. Element dimensions are specified metrically. EAN is used primarily in retail.

EAN/U.P.C.	A fixed-length, numeric 13-digit bar code symbol consisting of 30 dark elements and 29 intervening light elements. Each character is represented by 2 bars and 2 spaces over 7 modules. A bar may be comprised of 1, 2, 3 or 4 modules. Each EAN/U.P.C. symbol consists of a leading quiet zone, a start pattern, 7 left-hand data characters, a center bar pattern, 5 right-hand data characters, a Modulo 10 check character, a stop pattern and a trailing quiet zone. U.P.C. is often considered a 12-digit code. The 13th digit of EAN/U.P.C. symbol is a derived character in the left-most position. In the case of U.P.C., this derived left-most character is a 0.
Element	Generic term for a bar or space.
Encoded Area	Total linear dimension occupied by all characters of a code pattern, including start/stop characters and data.
Error Correction	A reader or decoder's use of mathematical schemes to reconstruct or replace damaged or missing symbol characters to enable the reading of the symbol data.
Error Detection	This occurs when error-correction characters detect that the presence of errors in the symbol exceeds the error correction capacity, and keeps the symbol from being decoded as erroneous data.
Error-Correction Characters	Symbol characters used for error correction and detection, calculated automatically from the other symbol characters.
Error-Correction Level	An indicator of the number of characters used in a symbology for error correction. A higher level of error correction allows for correcting greater potential symbol damage.
Error-Detection Characters	Symbol characters reserved for error detection that are calculated automatically from the other symbol characters.
Fixed Beam Bar Code Reader	A scanning device where scanning motion is achieved by moving the object relative to the reader; as opposed to a moving beam reader.
Guard Bars	Bars located at both ends and the center of a UPC and EAN symbol to provide reference points for scanning.
Horizontal Bar Code	A bar code or symbol with an overall length dimension that is parallel to the horizon, which resembles a picket fence.
Host Computer	A computer that serves other terminals in a network, providing such services as computation, database access, supervisory programs, and network control.
IEC	International Electrotechnical Commission. This international agency regulates laser safety by specifying various laser operation classes based on power output during operation.
IEC (825) Class 1	This is the lowest power IEC laser classification. Conformity is ensured through a software restriction of 120 seconds of laser operation within any 1000 second window and an automatic laser shutdown if the scanner's oscillating mirror fails.
Intercharacter Gap	The space between two adjacent bar code characters in a discrete code.
Interleaved 2 of 5	A binary bar code symbology representing character pairs in groups of five bars and five interleaved spaces. Interleaving provides for greater information density. The location of wide elements (bar/spaces) within each group determines which characters are encoded. This continuous code type uses no intercharacter spaces. Only numeric (0 to 9) and START/STOP characters may be encoded.
Interleaved Bar Code	A bar code in which characters are paired together, using bars to represent the first character and the intervening spaces to represent the second.

LASER - Light Amplification by Stimulated Emission of Radiation	The laser is an intense light source. Light from a laser is all the same frequency, unlike the output of an incandescent bulb. Laser light is typically coherent and has a high energy density.
Laser Diode	A gallium-arsenide semiconductor type of laser connected to a power source to generate a laser beam. This laser type is a compact source of coherent light.
Laser Scanner	An optical bar code reading device using a coherent laser light beam as its source of illumination.
LED Indicator	A semiconductor diode (LED - Light Emitting Diode) used as an indicator, often in digital displays. The semiconductor uses applied voltage to produce light of a certain frequency determined by the semiconductor's particular chemical composition.
Matrix Symbols	A 2-dimensional array of regular polygon shaped cells where the center-to-center distance of adjacent elements is uniform. The arrangement of the cells represents data and/or symbology functions. Matrix symbols may include recognition patterns that do not follow the same rule as the other elements within the symbol (i.e., Data Matrix and MaxiCode).
MIL	1 mil = 1 thousandth of an inch; a unit of measure often used to quantify bar code printing and scanning dimensions.
Misread (Misdecode)	A condition which occurs when the data output of a reader or interface controller does not agree with the data encoded within a bar code symbol.
Module	(1) The narrowest nominal width unit of measure in a symbol. In certain symbologies, element widths are specified as multiples of 1 module. Equivalent to X dimension; or (2) a single cell in a matrix symbology used to encode 1 bit of data. In MaxiCode, the module shape is a regular hexagon. In Data Matrix, the module shape is nominally square. In PDF417, the module shape is a regular rectangle. In bar code symbologies, the module shape is a regular rectangle.
Module Check Digit or Character	A character within the symbol data field calculated using modular arithmetic that is used for error detection. The calculated character is determined by applying a code algorithm to the data field contents (see check character).
Moving Beam Bar Code Reader	A device where scanning motion is achieved by mechanically moving the optical geometry.
MRD	Minimum reflectance difference: a formula that is used to determine if there is an adequate difference between absorbed and reflected light.
Nanometer	Unit of measure used to define the wavelength of light that is equal to 10^{-9} meter.
Nominal	The exact (or ideal) intended value for a specified parameter. Tolerances are specified as positive and negative deviations from this value.
Nominal Size	Standard size for a bar code symbol. Most UPC/EAN codes are used over a range of magnifications (e.g., from 0.80 to 2.00 of nominal).
Non-Contact Reader/Scanner	Bar code readers requiring no physical contact with the printed symbol.
Non-read	The absence of data at the scanner output after an attempted scan, which is due to no code, defective code, scanner failure or operator error.
Omnidirectional	Bar codes read in any orientation relative to the scanner.
Optical Throw	The distance from the scanner face to the closest point at which symbol can be read; also, optical throw is the difference between range and depth of field.

Orientation	The alignment of the symbol's scan path. Two possible orientations are horizontal with vertical bars and spaces (picket fence) and vertical with horizontal bars and spaces (ladder).
Overhead	The fixed number of characters required for start, stop and checking in a given symbol. For example, a symbol requiring a start, stop and 2 check characters contains 4 characters of overhead.
Parameter	A variable that can have different values assigned to it.
PDF417	An error correcting 2-dimensional multi-row symbol developed in 1992 by Symbol Technologies, PDF417 symbols are constructed from 4 bars and 4 spaces over 17 modules. The symbol size is from 3 to 90 rows. There is no specified minimum or maximum for X or Y dimension. With at least the recommended minimum level of error correction, the recommended Y dimension is 3X. With less than the minimum recommended level of error correction, the recommended Y dimension is 4X. A quiet zone of 2X is specified on each side of a symbol. Because of delta decode techniques, the symbology is immune from uniform bar width growth. PDF417 supports cross-row scanning. The intellectual property rights associated with PDF417 have been committed to the public domain.
Percent Decode	The average probability that a single scan of a bar code would result in a successful decode. In a well-designed bar code scanning system, that probability should approach near 100%.
Pitch	Rotation of a bar code symbol in an axis parallel to the direction of the bars.
Plessey Code	A pulse-width, modulated bar code commonly used for shelf marking in grocery stores.
Postnet Code	Code developed by the U.S. Postal Service to assist in the automatic sorting of mail.
Print Contrast Signal (PCS)	Measurement of the contrast (brightness difference) between the bars and spaces of a symbol. A minimum PCS value is needed for a bar code symbol to be scannable. PCS = (RL - RD) / RL, where RL is the reflectance factor of the background and RD the reflectance factor of the dark bars.
Programming Mode	The state in which a scanner is configured for parameter values. See SCANNING MODE.
Quiet Zone	A clear space, containing no dark marks, which precedes the start character of a bar code symbol and follows the stop character.
Reflectance	Amount of light returned from an illuminated surface.
Resolution	The narrowest element dimension which is distinguished by a particular reading device or printed with a particular device or method.
RSS	Reduced Space Symbology: A family of space efficient symbologies developed by UCC.EAN.
Scan Area	Area intended to contain a symbol.
Scanner	An electronic device used to scan bar code symbols and produce a digitized pattern that corresponds to the bars and spaces of the symbol. Its three main components are: 1. Light source (laser or photoelectric cell) - illuminates a bar code. 2. Photodetector - registers the difference in reflected light (more light reflected from spaces). 3. Signal conditioning circuit - transforms optical detector output into a digitized bar pattern.
Scanning Mode	The scanner is energized, programmed, and ready to read a bar code.

Scanning Sequence	A method of programming or configuring parameters for a bar code reading system by scanning bar code menus.
Self-Checking Code	A symbology that uses a checking algorithm to detect encoding errors within the characters of a bar code symbol.
Skew	Rotation of a bar code symbol on an axis parallel to the symbol's length.
Space	The lighter element of a bar code formed by the background between bars.
Space Width	The thickness of a space measured from the edge closest to the symbol start character to the trailing edge of the same space.
Specular Reflection	The mirror-like direct reflection of light from a surface, which can cause difficulty decoding a bar code.
Stacked Symbol (2D Symbols)	A 2-dimensional (2D) symbol with sequences of linear (width-coded) data that are stacked one upon another (i.e., PDF417).
Start/Stop Character	A pattern of bars and spaces that provides the scanner with start and stop reading instructions and scanning direction. The start and stop characters are normally to the left and right margins of a horizontal code.
Substrate	A foundation material on which a substance or image is placed.
Symbol	A scannable unit that encodes data within the conventions of a certain symbology, usually including start/stop characters, quiet zones, data characters, and check characters.
Symbol Aspect Ratio	The ratio of symbol height to symbol width.
Symbol Density	The number of data characters per unit length; usually expressed as characters per inch (CPI).
Symbol Height	The distance between the outside edges of the quiet zones of the first row and the last row.
Symbol Length	Length of symbol measured from the beginning of the quiet zone (margin) adjacent to the start character to the end of the quiet zone (margin) adjacent to a stop character.
Symbology	The structural rules and conventions for representing data within a particular bar code type (e.g. UPC/EAN, Code 39).
Tilt	Rotation of a bar code symbol on an axis perpendicular to the substrate.
Tolerance	Allowable deviation from the nominal bar or space width.
Two-dimensional symbology	A machine-readable symbol which must be examined both vertically and horizontally to read the entire message. A 2-dimensional (2D) symbol may be one of two types of machine-readable symbols: a Matrix Symbol or a stacked symbol. 2D symbols differ from linear bar codes with the ability for high data content, small size, data efficiency and error correction capability.
UCC	Uniform Code Council: the organization that administers the U.P.C and other retail standards.
UCC.EAN-128	Code 128 with a Function 1 character in the first position that is the symbology used with the UCC.EAN format for a universal product number (UPN).
UPC	Universal Product Code. A relatively complex numeric symbology. Each character consists of two bars and two spaces, each of which is any of four widths. The standard symbology for retail food packages in the United States.
Variable Length Code	A code with a number of encoded characters within a range, as opposed to a code with a fixed number of encoded characters.

Vertical Bar Code A bar code pattern presented in such orientation that the symbol from start to stop is perpendicular to the horizon. The individual bars are in an array appearing as rungs of a ladder.

Visible Laser Diode (VLD) A solid state device which produces visible laser light.

Wand Scanner A handheld scanning device used as a contact bar code or OCR reader.

Wedge A device that plugs in between a keyboard and a terminal and allows data to be entered by a keyboard or by various types of scanners.

X Dimension The dimension of the narrowest bar and narrowest space in a bar code.

Y Dimension The height of the modules in a row of a 2-dimensional (2D) symbols.

Index

Numerics

A

B

C

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72-67563-02
Revision A — June 2004